EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON IMPROVEMENT OF GAIT AMONG HEMIPLEGIC PATIENTS IN SELECTEDHOSPITALS AT TIRUNELVELI.

DISSERTATION SUBMITTED TO

THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY

CHENNAI

IN PARTIAL FULFILLMENT FOR THE DEGREE OF

MASTER OF SCIENCE IN NURSING

APRIL 2014

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BY

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SRI K. RAMACHANDRAN NAIDU COLLEGE OF NURSING

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ABSTRACT

The Research Project, **"**A study to assess effectiveness of Proprioceptive neuromuscular facilitation on improvement of gait amonghemiplegic patients in selected hospitals, at Tirunelvelt". It was conducted in partial fulfillment of the requirement for the Degree of Master of science in nursing at Sri. K.Ramachandran Naidu College of Nursing which was affiliated to the Tamil Nadu, Dr. M.G.R Medical University, Chennai,during the year 2013-2014.

The Objectives of the study were:

- To assess the pretest and posttest level of gait among hemiplegic patients in experimental and control group.
- To find the effectiveness of Proprioceptive Neuromuscular facilitation on improvement of gait among hemiplegic patients in experimental group.
- To Compare the pretest and posttest level of gait among hemiplegic patients in experimental group.
- To associate the posttest level of gait among hemiplegic patients in experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits, andsystemic illness.

All Hypotheses were tested at 0.05 level of significant.

- H1 – The mean posttest level of gait among hemiplegic patients in experimental group will be significantly higher than the mean posttest level of gait in the control group.

- H2 – The mean posttest level of gait among hemiplegic patients will be significantly higher than the mean pretest level of gait in the experimental group

- H3 _ There will be a significant association between Posttest level of gait among hemiplegic patients in experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits,and systemic illness.

The framework of the study was based on the Modified Orlando's Deliberative Nursing Process Theory.

Totally sixty patients were selected from three hospitals. Thirty were selected to experimental group, thirty patients were selected to control group. The sample was selected based on the criteria for sample collection. According to purposive sampling technique the patients were selected to the experimental group and control group. Assessment on the level of gait was done for both experimental and control group by modified Wisconsin gait scale. The experimental group received proprioceptive neuromuscular facilitation exercises for about 30-minutess, two times a day for six days.An evaluation was carried out for the experimental group and control group after 6days by using modified Wisconsin gait scale.

The Research design was Quasi experimental – Pretest and Posttest control group design.

The setting of the study was Shifa hospital, Peace health centre, and Galaxy hospital at Tirunelveli. It was situated about 50kms fromSri.K.Ramachandran Naidu College ofNursing at Tirunelveli.

The descriptive and inferential statistics were used to analyze the data.

The significant Findings of the study were:

On analysis of frequency and percentage of demographic variables, majority of the patients 14(46.7%) were between the age group of 51-60 years among hemiplegic patients in experimental group, whereas in the control group 16(53.3%) of subjects were between the age group of 51-60 years. With regard to gender classification, majority of patients 22(73.3%) were male in the experimental group, whereas in the control group 21(70%) of subjects were male.

With respect to education majority of the patients 8(26.7%) were having higher secondary school education in the experimental group, whereas in the control group 7(23.3%) of subjects were illiterate. With regard to occupation majority of patients 14(46.7%) were belongs to moderate worker in the experimental group, whereas in the control group 15(50%) of subjects were belongs to moderate worker.

Regarding the body mass index majority of patients, 15(50%) of them were overweight in the experimental group. whereas in the control group, majority of patients 13(43.3%) of them were having overweight.

With respect to bad habits majority of the patients 16(53.3%) were did not have any bad habits in the experimental group, whereas in the control group 19(63.3%) of them were having bad habits. With regard to dietary habits majority of patients 25(83.3%) were non vegetarian in the experimental group, whereas in the control group 27(90%) of subjects were non vegetarian.

Regarding the systemic illness majority of patients, 14(46.7%) of them were having hypertension in the experimental group. whereas in the control group, majority of patients 12(40%) of them were having hypertension.

The unpaired `t' test was used to compare the posttest level of gait among hemiplegic patients between experimental and control group. It was found that the 't' value was 7.16 indicating that there is more significant difference in post test level of gait between the experimental and control group at $p<0.05$ level. Hence the stated research hypothesis, "the mean post test level of gait among patients with hemiplegia in experimental group will be significantly higher than the mean post test level of gait in control group." was accepted.

The paired't' test was used to compare the pre and posttest level of gait among experimental group. With regard to the pre and posttest level of gait among experimental group it was found that the't' value was 10.98, indicating that there was a highly significant reduction in gait impairment among the experimental group at $p<0.05$ level. Hence the stated research hypothesis, "the mean post test level of gaitamong hemiplegic in experimental group will be significantly higher than their mean pre test level of gait" was accepted.

Based on the findings of the study, it is recommended that,

Based on the findings of the present study the following recommendations were made:

1. The similar study can be conducted with large samples for better generalisation.
2. The study can be conducted to assess the knowledge and practice of nurses with regard to proprioceptive neuromuscular facilitation for hemiplegic patients.

3. A comparative study can be conducted by using Proprioceptive neuromuscular facilitation versus massage therapy on improvement of gait among hemiplegic patients.
4. The similar study can be conducted in the community setting for hemiplegic patients.
5. The same study can be repeated by using the true experimental design.

As a nurse working in hospital has a vital role to provide effective nursing care for the patients. The nurses are needed to develop their knowledge and skills in management of hemiplegic patients and early application of exercises to improve gait and to prevent hemiplegic stroke immobility. Proprioceptive neuromuscular facilitation is the best method to improve hemiplegic gait in a short period.

CONCLUSION

The key conclusion that there was a significant improvement on the level ofgait among patients with hemiplegiawho received proprioceptive neuromuscular facilitation exercises. It was easy to apply and potentially risk free intervention. Thus an application of proprioceptive neuromuscular facilitation exercise was effective to improve gaitamong hemiplegic patients.

CHAPTER – I

INTRODUCTION

"Although the world is full of suffering, it is full also of the overcoming of it."

- Helen Keller

BACKGROUND OF THE STUDY

People's life style in developed and developing countries has changed considerably over the last few decades. Rapid changes in diets and lifestyles resulting from industrialization, urbanization, economic development and market globalization, have accelerated during the last decade. While standards of living have improved and the access to services has increased, there have also been significant negative consequences in terms of inappropriate dietary patterns and decreased physical activity and a corresponding increase in diet-related chronic diseases. Hence people suffer with number of chronic diseases; among this stroke is a common chronic disease.

Stroke is a global health problem. It is the second commonest cause of death and fourth leading cause of disability worldwide.**(Strong, 2007)**

The burden of stroke in India is increasing due to urbanization, sedentary life style, smoking, alcoholism, high fat diet and obesity etc. Current statistics for stroke survival rates are, 10 percent of stroke victims recover almost completely. 25 percent of stroke victims recover with minor impairments.40 percent of stroke victims experience moderate to severe impairments requiring special care.10 percent of stroke victims require care in a nursing home or other long-term care facility.15 percent die shortly after the stroke.**(Stroke in India fact sheet,Updated 2012)**

A stroke, sometimes referred to by the older term cerebrovascular accident (CVA), is the rapid loss of function in the brain due to disturbance in the blood supply to the brain. This can be due to ischemia (lack of blood flow) caused by blockage (thrombosis, arterial embolism) or a internal bleeding. As a result, the affected area of the brain cannot function, which mightresult in a hemiplegia in one or more limbs on one side of the body. World Health Organization defined stroke as a "neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours."(**WHO, 2004)**

The main manifestations are, patient may stumble or experience sudden dizziness, loss of balance or loss of coordination, slurring words or having difficulty in understanding speech.Patient may develop sudden numbness, weakness or paralysis in face, arm or leg, especially on one side of the body.Troublewith seeing in one or both eyes, patient may suddenly have blurred or blackened vision in one or either eyes, or patient may see double.A sudden, severe headache, which may be accompanied by vomiting, dizziness or altered consciousness, may indicate having a stroke.**(Rick Daniels and Laura John Nosek, 2007)**

Many factors can increase the risk of a stroke. Potentially treatable risk factors are high blood pressure, cigarette smoking, high cholesterol, diabetes, being overweight or obese, obstructive sleep apnea (a sleep disorder in which the oxygen level intermittently drops during the night), cardiovascular disease, including heart failure, heart defects, abnormal heart rhythm, use of some birth control pills or hormone therapies, heavy or binge drinking and use of illicit drugs.Other non modifiable risk factorsare family history of stroke, being age 55 or older; in gender men have a higher risk of stroke than women.A stroke may be caused by a blocked

artery (ischemic stroke) or a leaking or burst blood vessel (hemorrhagic stroke). Some people may experience a temporary disruption of blood flow throughtheirbrain(transient ischemic attack).**(Edward C. Jauch, 2010)**

There are more than 600,000 people with disabilities worldwide, and hemiplegia is one of the more common disabling conditions. It is caused by disease or injury to the opposite hemisphere of the brain.People with hemiplegia often display difficulties in mobility, cardiopulmonary function, and sensory functioning. These difficulties affect their activities in daily living and thus have a negative impact on the quality of their life. **(Kong & Yang, 2006)**

Hemiplegia means severe weakness of the limbs on one side of the body but the specific features can vary tremendously from person to person. The most common cause of hemiplegia is damage to the corticospinal tracts in one hemisphere of the brain due to obstruction or rupture of a cerebral artery. The corticospinal tracts extend from the lower spinal cord to the cerebral cortex. They decussate, or cross, in the brainstem; therefore, damage to the right cerebral hemisphere results in paralysis of the left side of the body. Damage to the left hemisphere results in paralysis of the right side of the body and may also result in aphasia.**(Jeffrey L. Saver, 2003)**

Emergency treatment with medications therapy with clot-busting drugs (thrombolytic) must start within 4.5 hours. Quick treatment not only improves the chances of survival but also may reduce the complications from hemiplegia.**(Lewis, 2011)**

In persons with hemiplegia, posture,tone and coordinated reciprocal movements, which are required for normal gait, are usually impaired. Normal

reciprocal pelvic movement is often replaced by a fixed pelvic retraction, which makes it difficult for patients to swing the affected lower extremity forward. The resultant gait is slow with a short step length and asymmetric steps. Often called "hemiplegic gait," this slow gait can be observed in clinical settings as a decrease in gait speed and cadence. Improvement of the quality of gait is often a major goal of physical therapy for patients with hemiplegia. Proprioceptive neuromuscular facilitation (PNF) is one approach commonly used to improve the gait of patients with hemiplegia. **(Wang R.Y,2003)**

Proprioceptive neuromuscular stretching, are stretching techniques commonly used in clinical environments to enhance both active and passive range of motion with the ultimate goal being to optimize motor performance and rehabilitation. The literature regarding PNF has made the technique the optimal stretching method when the aim is to increase range of motion, especially in short-term changes. Generally an active PNF stretch involves a shortening contraction of the opposing muscle to place the target muscle on stretch; this is followed by an isometric contraction of the target muscle. Proprioceptive muscular facilitation (PNF) stretches are the most effectivestretches available to a hemiplegic patient with limited mobility.**(Margaret Knott PT, and Herman Kabat MD, 2005)**

The basic premise of PNF is that weak muscles can be facilitated, or activated through specific patterns in order to produce irradiation. These patterns are effective because the motions require muscles to work in multiple planes and to contract over two or more joints at once. This has great importance due to the fact that these are the motions that occur every day with functional activities.**(Knarr B.A, 2004)**

NEED FOR THE STUDY

Stroke is a global health problem. It is the second commonest cause of death and fourth leading cause of disability worldwide. Approximately 20 million people each year will suffer from stroke and of these 5 million will not survive. Stroke is also a predisposing factor for epilepsy, falls and depression and is a leading cause of functional impairment, with 20% of these survivors requiring institutional care and 15% - 30% being permanently disabled. **(Fisher, 2011)**

Until 4 decades ago, the rates of stroke in low-and middle-income countries were considerably lower than those in more economically healthy countries. In the intervening years, however, the rates of stroke in places such as Southern India and rural South Africa have approximately doubled;whereas stroke rates in more economically developed nations have decreased. **(Mathers, 2006)**

The Global Burden of Disease Study estimated a population-based annual stroke incidence of India to be 89/100,000 in 2005, which is projected to increase to 91/100,000 in 2015 and to 98/100,000 in 2030.Men are more likely to have a stroke than women: the male/female sex ratio for India is 7:1. This may be due to differences in risk factors such as smoking and drinking alcohol which are more prevalent among men in India compared with women. **(Bhattcharya et al, 2005)**

Hemiplegiadue to stroke is a life-changing event that affects not only the person who may be disabled, but their family andcaregivers. Utility analyses show that a hemiplegia is viewed by as beingworse than death. In many high-income countries, hemiplegia management has changedsubstantially in the past two decades. Impressive developments through structured clinical pathways forthrombolysis and secondary prevention have been made. **(Warlow, 2008)**

In South Asian countries demographic changes, urbanization and increased exposure to major risk factors will fuel the hemiplegic stroke burden in the future. The prevalence of hemiplegic stroke in India is 44–843/100,000 (from community-based studies), 500–2000/100,000 in Bangladesh, 218/100,000 in Pakistan and 1000/100,000 in Sri Lanka.**(DeepthiVibha, 2013)**

In a published literature there are reports on prospective and retrospective surveys for “hemiplegia” in India. The prevalence rates (or estimates) for “completed strokes” for North India (Kashmir) being 143/100,000 persons; for West India (Mumbai) at 245/100,000; for South India (Vellore) it has been 64/100,000 and for East India (Assam) it was 270/100,000. The average range is being 90-220/100,000 persons. It is generally agreed that hospital incidence of a disease is a flawless figure by which to judge the prevalence of the hemiplegia in a population. **(PM Dalal, 2011)**

An Epidemiological Study of hemiplegia due to stroke was conducted in Vellore, South India. A total of 1,245 persons were identified as suffering from paralysis, paresis, inability to use a limb, bed-ridden, etc., and were classified as "suspects" by the field workers. Of the 1,245 "suspects," 147 were identified as genuine strokes with hemiplegia by the neurologists. It is also observed that 40 of the confirmed hemiplegics among the 147, or nearly 25%, were under 40 years of age. The prevalence rate per 100,000 populations is 68.5 in males and 44.8 in females. **(J. Abraham, 2007)**

Proprioceptive Neuromuscular Facilitation (PNF) is a stretching technique utilized to improve muscle elasticity and has been shown to have a positive effect on active and passive range of motions. In clinical settings, PNF is already utilized by

therapists to restore functional range of motion (ROM) and increase strength in patients who were affected by hemiplegia. **(Funk et al, 2003)**

Neurophysiologists developed the clinical PNF stretching technique using natural movement patterns. They knew of the myostatic stretch reflex which causes a muscle to contract when lengthened too quickly, and of the inverse stretch reflex, which causes a muscle to relax when its tendon is pulled with too much force. They believed combinations of movement would be better than the traditional moving of one joint at a time. PNF stretching is positioned in the literature as the most effective stretching technique, particularly in respect to short-term changes in ROM. **(Reiki S, 2012)**

Across sectional study on immediate and cumulative effects on proprioceptive neuromuscular facilitation was conducted among hemiplegic patients inNational Yang-Ming Medical College, Taiwan. Twenty patients with hemiplegia (12 men and 8 women) were participated in this study. After effective 12 sessions of PNF exercises immediate improvement in gait and speed were found. **(Wang R.Y, 2003)**

Based on the review of literature, India will soon face an enormous huge socio economic burden in rehabilitating hemiplegic patients. The investigator felt introducing proprioceptive neuromuscular facilitation immediately after acute emergency management to enhance range of motion of hemiplegic patientsespecially in short-term. This motivated the investigator to select this study.

STATEMENT OF THE PROBLEM

A study to assess the effectiveness of Proprioceptive neuromuscular facilitation on improvement of gait among hemiplegic patients in selected hospitals, at Tirunelveli.

OBJECTIVES

- To assess the pretest and posttest level of gait among hemiplegic patients in experimental and control group.
- To find the effectiveness of Proprioceptive Neuromuscular facilitation on improvement of gait among hemiplegic patients in experimental group.
- To compare the pretest and posttest level ofgait among hemiplegic patients in experimental group.
- To associate the posttest level of gait among hemiplegic patients in experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness.

HYPOTHESES

- H1 – The mean posttest level of gait among hemiplegic patients in experimental group will be significantly higher than the mean posttest level of gait in the control group.
- H2 – The mean posttest level of gait among hemiplegic patients will be significantly higher than the mean pretest level of gait in the experimental group.
- H3 _ There will be a significant association between posttest level of gait among hemiplegic patients in experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness.

OPERATIONAL DEFINITIONS

ASSESS

It refers to systematically and continuously, collecting, validating, and communicating the patient data regarding the improvement of gait after application of proprioceptive neuromuscular facilitation among hemiplegic patients and it is assessed by modified Wisconsin gait scale.

EFFECTIVENESS

In this study effectiveness means improvement of gait among hemiplegic patients after performing proprioceptive neuromuscular facilitation exercises.

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION

It refers to exercises provided to the hemiplegic patients. Proprioceptive neuromuscular facilitation is a method of stretching muscles to maximize their flexibility that is performed by the researcher,and it involves a series of contractions and relaxations. The researcherappliedFlexion – abduction – external rotation, Extension – adduction – internal rotationand Flexion – adduction – internal rotation, Extension – abduction – external rotationin the affected side of upper extremity and lower extremity.The researcher did ten repetitions of each pattern of proprioceptive neuromuscular facilitation exercises before proceeding to the next pattern. Exercises were done 30 minutes2 times in a dayfor 6 days.

GAIT

It refers to the pattern of movements of limbs of hemiplegic patients during locomotion assessed by using the modified Wisconsin gait scale.

HEMIPLEGIA

It refers to the total paralysis of the arm, and leg on the same side of the body and it is assessed by using the modified Wisconsin gait scale.

PATIENTS

It refers to the persons who were affected with hemiplegia, between the age group of 31 - 60 years in selected hospitals, at Tirunelveli.

ASSUMPTION

- All hemiplegic patients may experience difficulty in movement.
- Proprioceptive neuromuscular facilitation application may improve the gait among hemiplegic patients within short duration.
- It may reduce the economic burden and hemiplegic immobility.
- It may improve the independency and quality of life of hemiplegic patients.

DELIMITATIONS

- The studyis delimitedto 4weeks of period.
- The study is delimited to hemiplegic patients in selected hospitals of Tirunelveli.
- The Studyis delimited tothose arewilling to Participate.
- The Studyis delimited to conscious hemiplegic patients.

PROJECTED OUTCOME

The finding of the study will help the nurses to plan the proprioceptive neuromuscular facilitation on improving gait among hemiplegic patients. The Proprioceptive neuromuscular facilitation is an effective method to reducehemiplegic immobility. It improves gait, independence and quality of life in hemiplegic patients.

CONCEPTUAL FRAMEWORK

The conceptual for research study presents the measure on which the purpose of the proposed study is based. The framework provides the perspective from which the investigator views the problem.

The study is based on the concept that the effectiveness of proprioceptive neuromuscular facilitation exercises on improvement of gait among hemiplegic patients who have gait impairment.

The investigator adopted the **Modified Orlando's Deliberative Nursing Process Theory.**

According to Orlando a person is viewed as a human being who exhibits verbal and non verbal behavior. Health is observed as feeling of adequacy and wellbeing from mental and physical discomfort. Nursing action is dynamic and responsive to changes in a patient's situation.

The components of Orlando's nursing process theory are:

1 Patient behavior

2 Nurse action

3 Patient reaction

1. Patient behavior

Nursing process theory, no matter how significant the patient's behavior is, it may represent a cry for help. The persons who not resolve a need feels, helpless, and the person's behavior reflects this feeling. It can be verbal or non verbal. Here the patient behavior includes subject's age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness.

2. Nurse action

In this model nurse action refers as whatever the nurse says or does to benefit the patient. It occurs after the nurse interprets with the patient behavior. In this present study it includes application of proprioceptive neuromuscular facilitation to hemiplegic patients with gait impairment.

3. Patient reaction

According to Orlando patient reaction is referred to the actions that are evaluated the effectiveness immediately after the nursing activity. In this present study it refers to the post assessment of gait level and outcome of the system interaction that is the effectiveness of proprioceptive neuromuscular facilitation exercises on improving gait impairment level.

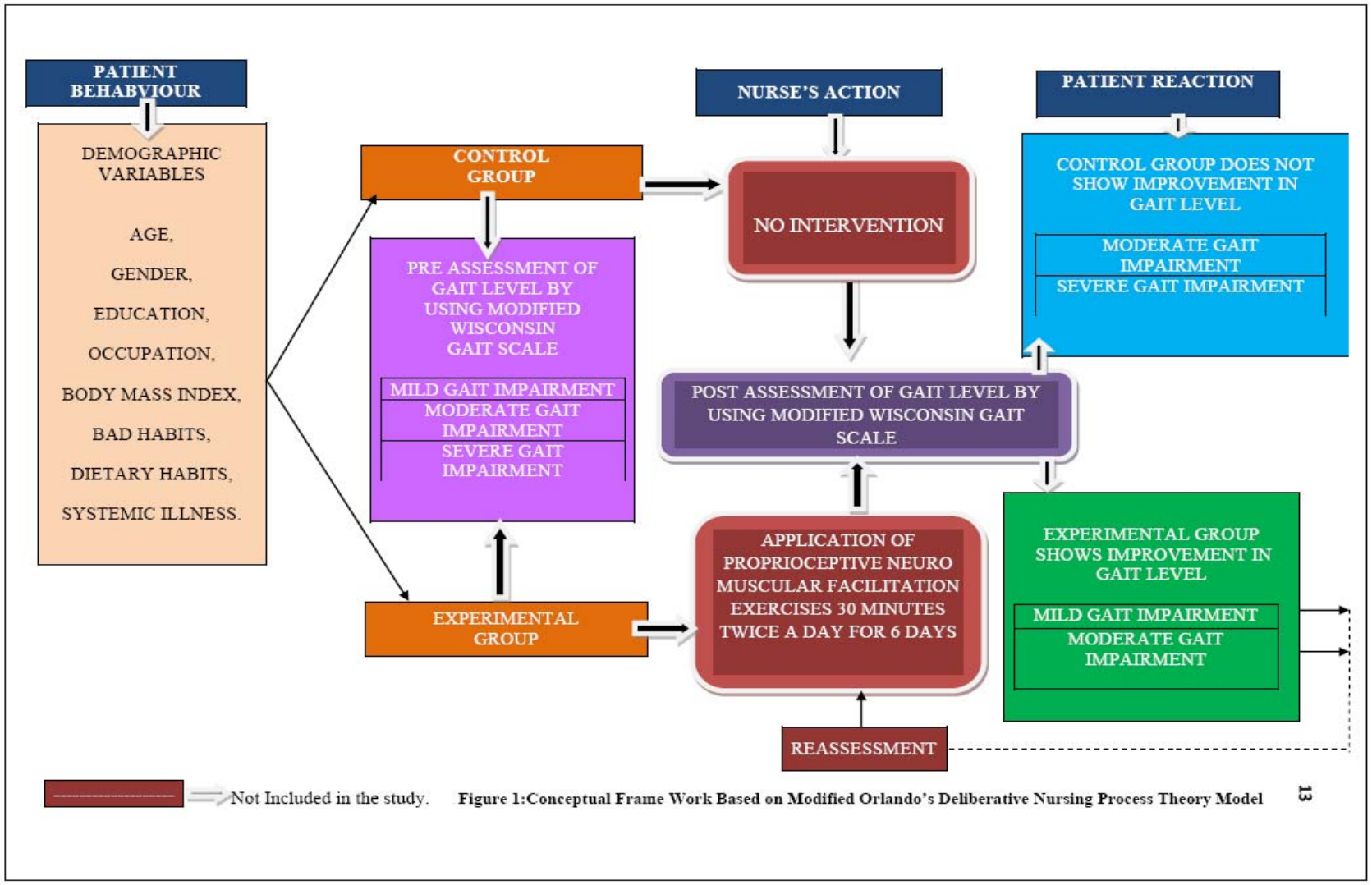

Figure 1:Conceptual Frame Work Based on Modified Orlando's Deliberative Nursing Process Theory Model

CHAPTER II

REVIEW OF LITERATURE

Review of literature is defined as a critical summary of review on a topic of interest, often prepared to put a research problem in contest **(Polit& Beck, 2006)**.

The review of literature in the research report is a summary of current knowledge about a particular practice problem and includes what is known and not known about the problem. The literature is reviewed to summarize knowledge for use in practices or to provide a basis for conducting study **(Burns, 1997).**

THE REVIEW OF LITERATURE IS ORGANIZED UNDER FOLLOWING SECTIONS:

- **Section A:** Studies related to prevalence and risk factors of hemiplegia.
- **Section B:** Studies related to gait impairment among hemiplegic patients.
- **Section C:** Studies related to proprioceptive neuromuscular facilitation on improvement of gait among hemiplegic patients.

Section A: Studies related to prevalence and risk factors of hemiplegia.

DeepthiVibha, et al, (2013), conducted a study on, "Hemiplegic strokein South Asia – A burning problem" in All India Institute of Medical Sciences, New Delhi, India. In South Asian countries demographic changes, urbanization and increased exposure to major risk factors will fuel the hemiplegic stroke burden in the future. The prevalence of hemiplegic strokes in India is 44–843/100,000 (from community-based studies), 500–2000/100,000 in Bangladesh, 218/100,000 in Pakistan and

1000/100,000 in Sri Lanka and community-based prevalence studies in these countries are still lacking. There are no data on hemiplegia prevalence from Nepal. Incidence studies are still less and an Indian study reported an incidence of 145/100,000. Incidence studies from other South Asian countries are lacking. This review attempts to give an overview of the evidence so far on the burden of hemiplegic strokein this part of the globe.

Sajjad A, et al, (2013), conducted a study on, "systematic evaluation of hemiplegic surveillance studies in low- and middle-income countries" by the Department of Public Health and Primary Care, India. Electronic databases Medline, Embase, Scopus, and Web of Knowledge were searched for population-based surveillance studies. Studies conducted in the LMI countries that reported on incident hemiplegia were included. Data were extracted from each study using a pre structured format. Information on epidemiologic measures including crude and age-adjusted incidence rates, person-years, admission rates, case fatality rates, death certification, autopsy rates, measures of disability, and other study-specific information were recorded. During this they identified 7 studies that reported on burden of hemiplegia in 9 LMI countries, the age-adjusted incidence rates across the LMI countries varied widely, with the burden of total first-ever hemiplegia ranging from 41 to 909 events per 100,000 persons per years.

Poungvarin N, et al (2011), conducted a community based cohort study to assess hemiplegic stroke prevalence and risk factors in five geographic regions of Thailand by Ministry of Public Health, Bangkok, Thailand. All participants who were suspicious of being hemiplegic victims were verified. In this analysis, baseline data of 19,997 participants aged 45 to 80 years were identified and analyzed as a cross-

sectional analysis. Three hundred and seventy six subjects were proved to have a hemiplegia thus resulting the crude prevalence of hemiplegia to be 1.88%. Using multiple logistic regression analysis, factors associated with higher hemiplegia prevalence were male gender ($p < 0.001$), occupational class ($p < 0.001$), geographic region ($p < 0.001$), hypertension ($p < 0.001$), diabetes mellitus ($p = 0.002$) and hypercholesterolemia ($p = 0.026$).

Kameshwar Prasad and Kapil K Singhal, (2010), conducted a study on, "hemiplegic stroke in young: An Indian perspective." The issue of hemiplegia in young in India has long been of interest to neurologists in the country. The age group for hemiplegia in young has been variable between different studies but perhaps should be restricted to 15-49 years as this age group tends to have a unique set of causes and risk factors. There is no evidence indicating higher incidence of hemiplegic stroke in young in India than in other countries. Age-specific incidence rates from recent population-based studies from India are comparable to the western populations. Though the traditional risk factors of hemiplegia play a significant role in young age group also, the presence of high number of cryptogenic hemiplegicstrokes, cardioembolic and venous strokes makes diagnostic evaluation in this age group more challenging.

Kaul S, et al (2009), conducted a study on, "Hemiplegia and related risk factors in developing countries with special reference to India" in Department of Neurology, Nizam's Institute of Medical Sciences, Hyderabad. The average annual incidence rate of hemiplegia in India currently is 145 per 100,000 populations, which is higher than the western nations. Rapid socio-economic changes have led to changes in people's lifestyle, work related stress, altered food habits and the risk of developing

hypertension, diabetes and hyperlipidaemia. This coupled with increased lifespan has resulted in increase in the incidence of hemiplegia. Indians may also be genetically prone for stroke and hemiplegia due to high prevalence of metabolic syndrome. In India 10% to 15% of hemiplegia occur in people aged below 40 years. Up to 80% of hemiplegic strokes in India are ischaemic in nature, among which intracranial atherosclerosis is the most common mechanism.

PK Sethi, et al (2007), conducted a study about, "Hemiplegic stroke: The Neglected Epidemic, an Indian perspective". Unfortunately in India, epidemiological information on annual incidence, prevalence rates, and morbidity and mortality trends in well defined populations is not available. Most of data published is from retrospective analysis of subjects admitted to urban medical hospitals though the majority of Indian population lives in small towns and villages. Despite these limitations, analysis of data collected from major urban hospitals suggested that nearly 2% of all hospital admissions; 4-5% of medical and 20% of neurological admission have CVD. The incidence of hemiplegia in the young (< 40 years of age) was high (13 to 32%) when compared to similar data from the west. Literature is available suggesting that risk of coronary artery disease (CAD) is higher in Indians especially in the young population.

J. Abraham, et al (2007), conducted a study on, “An Epidemiological Study of Hemiplegic Stroke” in Vellore, South India. A total of 1,245 persons were identified as suffering from paralysis, paresis, inability to use a limb, bed-ridden, etc., and were classified as "suspects" by the field workers. Of the 1,245 "suspects," 147 were identified as genuine strokes with hemiplegia by the neurologists. It is also observed that 40 of the confirmed hemiplegics among the 147, or nearly 25%, were

under 40 years of age. The prevalence rate per 100,000 populations is 68.5 in males and 44.8 in females. It is evident that the prevalence rate increases with age and that there is a statistically significant male preponderance in the age groups above 50 years ($P < 0.01$).

Fugl-Meyer, et al (2005), conducted a study on, "Hemiplegic stroke the incidence and mortality" in Sweden. A review of recent literature on incidence, mortality and prevalence of stroke with special emphasis on hemiplegia is given. A combined retrospective/prospective study of first stroke with hemiplegia before age 66 was assessed. Return to work is correlated to degree of motor handicap and probably also to age. In the Swedish population of 8 million, each year about 2,300 individuals, still in their vocationally active years, fall victim to first stroke with hemiplegia. Of these, more than 1,000 will survive more than 6 years, but only about 300-400 of these can under the present circumstances be actively re-employed. It is felt that more active vocational measures would be beneficial for both handicapped individuals and society.

Walker,et al (2004), conducted a study on, "Age specific prevalence of impairment and disability relating to hemiplegic stroke" in the Hai District of northern Tanzania. During the yearly house to house census of the study population specific questions were asked to identify those who might be disabled from hemiplegic stroke. People thus identified were subsequently interviewed and examined by one investigator. One hundred and eight patients, 61 men and 47 women, were identified with a median age of 70 (range 18-100). Median age at first stroke with hemiplegia was 65 years. The age specific rates in this study were lower than previous studies in developed countries. All were cared for at home although 23 (21%) were bedbound,

with less than 6% being aged 65 and over. With the demographic transition hemiplegic stroke is likely to become a more important cause of disability in sub-Saharan Africa.

S. Razdhan, et al, (2003), conducted a study on, "Hemiplegia in rural Kashmir, India".Theystudied the Kuthar Valley in the Anantnag District of south Kashmir (northwestern India) to ascertain the prevalence and pattern of completedhemiplegia. They detected 91 cases, giving a crude prevalence rate of 143/100,000. However, age-specific prevalence was 41/100,000 in the group aged 15-39 years and 630/100,000 in the group aged greater than or equal to 40 years; 69.23% of the cases were in men. Hypertension was present in 58.24% of the cases, while hemiplegia due to valvular heart disease and puerperium-related hemiplegia were most common in the young.

Section B: Studies related to gait impairment among hemiplegic patients.

Chen G, et al (2013), examined the, "Gait differences between individuals with stroke related hemiplegia and non-disabled controls at matched speeds" in Rehabilitation Center, Palo Alto, USA. Treadmill walking was used to assess the consistent gait differences between six individuals with post-stroke hemiparesis and six non-disabled, healthy controls at matched speeds. Kinematic and insole pressure data were collected from multiple, steady-state gait cycles. A large set of gait differences found between hemiparetic and non-disabled subjects was consistent with impaired swing initiation in the paretic limb and related compensatory strategies. A second set of gait differences found was consistent with impaired single limb support on the paretic limb (i.e., shortened support time on the paretic limb). The differences

provide insights, concerning hemiplegic impairment and related compensatory strategies that are in addition to the observation of slow walking speed.

Verma R, et al (2012), conducted a study on, "Understanding gait control in hemiplegic patients, implications and management" in Department of Neurology, UP, India. The role of the brain in post-stroke gait is not understood properly, although the ability to walk becomes impaired in more than 80% of post-stroke patients. Most, however, regain some ability to walk with either limited mobility or inefficient, asymmetrical or unsafe gait. Conventional intervention focuses on support of weak muscles or body part by use of foot orthosis and walking aids. Mammalian locomotion is based on arhythmic, "pacemaker" activity of the spinal stepping generators. Bipedal human locomotion is different from quadripedal animal locomotion. However, knowledge derived from the spinal cord investigation of animals, is being applied for management of human gait dysfunction. The potential role of the brain is now recognized in the independent activation of muscles during walking.

Knarr B.A, et al (2009), conducted a study on, "Understanding compensatory strategies for muscle weakness during gait by simulating activation deficits seen inhemiplegics" in University of Delaware, Newark. The objective of this study was to identify available compensatory strategies for muscle weakness during gait by simulating activation deficits in multiple muscle groups. Three dimensional dynamics simulations were created from 10 healthy subjects and constraints were set on the activation capacity of the plantar flexor, dorsiflexor, and hamstrings muscle groups to simulate activation impairments seen post-stroke. When the muscle groups are impaired individually, the model requires that the plantar flexor, dorsiflexor, and

hamstrings muscle groups are activated to recreate the subjects' normal gait pattern. The models were unable to recreate the normal gait pattern with simultaneous impairment of all three muscle groups. Other muscle groups are unable to assist the dorsiflexor muscles during early swing, which suggests that rehabilitation or assistive devices may be required to correct foot drop.

Wissel J, Manack A, and Brainin M, (2009), conducted a study on, "Hemiplegic spasticity related disability" in Vivantes Hospital Spandau, Berlin. Hemiplegic spasticity related disability is emerging as a significant health issue for hemiplegic stroke survivors. Data on phases of the hemiplegic spasticity continuum revealed evidence of hemiplegic spasticity in 4% to 27% of those in the early time course (1-4 weeks poststroke), 19% to 26.7% of those in the postacute phase (1-3 months poststroke), and 17% to 42.6% of those in the chronic phase (>3 months post stroke). Data also identified key risk factors associated with the development of spasticity, including lower Barthel Index scores, severe degree of paresis, hemiplegic stroke-related pain, and sensory deficits. Applying these recommended measures, as well as increasing our knowledge of the physiologic predictors of hemiplegic spasticity related disability, will enable us to perform clinical and epidemiologic studies that will facilitate identification and early, multimodal treatment.

Sheffler L.R, et al (2008), conducted a study on, "Relationship between body mass index and rehabilitation outcomes in chronic hemiplegic stroke" in Department of Physical Medicine and Rehabilitation, Cleveland, USA. The aim of this study was to evaluate the relationship between body mass index (BMI) and change in motor impairment and functional mobility after a gait rehabilitation intervention in chronic stroke subjects. Correlation and linear regression analyses of pretreatment and end-of-

treatment Fugl-Meyer scores and modified Emory Functional Ambulation Profile scores from hemiparetic subjects (n = 108, >3 months post stroke) who participated in a randomized controlled trial comparing two 12-wk ambulation training treatments were generated. A series of linear regression models that controlled for age, sex, stroke type, interval post-stroke, and training device found the change in the "up and go" modified Emory Functional Ambulation Profile score to be significantly positively associated with BMI.

Meijer R, et al, (2006), conducted a cohort study on, "Markedly impaired bilateral coordination of gait inhemiplegic strokepatients," in Rehabilitation Medical Centre Groot Klimmendaal, Netherlands. Twelve ambulatory stroke patients and age-matched healthy adults wore a tri-axial piezo-resistive accelerometer and walked back and forth along a straight path in a hall at a comfortable walking speed during 2 minutes. Gait speed, gait asymmetry (GA), and aspects of the bilateral coordination of gait were determined. Bilateral coordination measures included the left-right stepping phase for each stride, consistency in the phase generation, accuracy in the phase generation, and Phase Coordination Index .This study concluded in ambulatory post-stroke hemiplegic patients, two gait coordination properties, GA and PCI, are markedly impaired.

Raja B, Neptune RR, et al (2006), conducted a study on, "coordination on the non paretic leg during hemiparetic gait, and novel compensatory patterns" in university of Florida, USA. Post-stroke hemiparesis is usually considered a unilateral motor control deficit of the paretic leg, while the non-paretic leg is assumed to compensate for paretic leg impairments. Data were recorded from sixty individuals with chronic hemiparesis, divided into three speed-based groups, and twenty similarly

aged healthy individuals. All walked on an instrumented split-belt treadmill at their self-selected speed and control subjects also walked at slower speeds matching those of the persons with hemiparesis. Most novel compensations were made possible by altered kinematics of the paretic and non-paretic leg while others appeared to be available mechanisms for increasing propulsion.

Disa k, et al, (2004), conducted a study on, “Spasticity AfterHemiplegic Stroke, Its Occurrence and Association with Motor Impairments and Activity Limitations**”.** Ninety-five patients with first-ever stroke were examined initially (mean, 5.4 days) and 3 months after stroke with the Modified Ashworth Scale for spasticity; self-reported muscle stiffness; tendon reflexes; BirgittaLindmark motor performance; Nine Hole Peg Test for manual dexterity; Rivermead Mobility Index; Get-Up and Go test; and Barthel Index. Of the 95 patients studied, 64 were hemiparetic, 18 were spastic, 6 reported muscle stiffness, and 18 had increased tendon reflexes 3 months after stroke. These findings indicate that the focus on spasticity in hemiplegic stroke rehabilitation is out of step with its clinical importance.

Lewek M.D, et al (2004), conducted a study on, "Non-paretic quadriceps activity influences paretic quadriceps activitydue to stroke related hemiplegia" in Department of Allied Health Sciences, University ofNorth Carolina, USA.Individuals with chronic stroke performed bilateral and unilateral(paretic and non-paretic) maximum voluntary isometric contractions. During reflextesting, the tendon tapping threshold to elicit paretic muscle and torqueresponses decreased with non-paretic activity ($p<0.05$).This study concluded Concurrent non-paretic activation resulted in a relativedisinhibition of the paretic quadriceps. The paretic limb's inability to

remaininactive during isolated non-paretic contractions implies increased excitation ordecreased inhibition of paretic motor pools, although the source remains unknown.

Srivastava A, et al (2004), conducted a Cross-sectional, descriptive study on, "Post-stroke depression: prevalence and relationship with disability in chronic hemiplegic stroke survivors" in Center for Physical Medicine & Rehabilitation, Bangalore, India. Data were collected on demographic data, stroke data (side and type of lesion and post-stroke duration), cognition (mini mental state examination), depressive ideation (Hamilton Depression Rating Scale), impairment (Scandinavian Stroke Scale), balance (Berg Balance Scale), ambulatory status (Functional Ambulation Category), walking ability (speed), and independence in activities of daily living (Barthel Index). Eighteen of the 51 participants (35.29%) met the criteria for depression. Demographic variables like male gender, being married, living in a nuclear family, urban background were significantly correlated with PSD ($P < 0.05$). This study concluded Depression occurs in one-third of chronic hemiplegic stroke survivors and is relevant in subjects referred for rehabilitation.

Section C: Studies related to proprioceptive neuromuscular facilitation on improvement of gait among hemiplegic patients.

Kumar. S, et al, (2013), conducted a study on, “Effect of PNF Technique on Gait Parameters and Functional Mobility in Hemiplegic Patients” inNaraingarh District, Haryana.The objective of the present study is to evaluate the effect of PNF techniques on the gait parameters and functional mobility in hemiplegic patients. A sample of convenience was used to select 30 subjects affected by cerebrovascular accident. Patients were assessed before commencement and after the completion of treatment sessions by a fixed battery of tests on Stride length, Gait Velocity, Cadence and

Functional Mobility parameters with measuring tape, stop watch and Rivermead Mobility Index respectively. The results of this study demonstrated that the PNF technique has significant effect on gait parameters & functional mobility as compared to conventional therapy in patients with hemiplegia.

YugalShrestha, (2013), conducted a study on, "a systematic literature review on the use of proprioceptive neuromuscular facilitation on hemiplegic gait." The purpose of this thesis was to review and critically analyze the literatures from 1990 to 2013 in order to investigate the methodological quality of the studies, indications and goals of PNF treatment among hemiplegic. The research method used for this thesis was systematic literature review. The manual search for relevant scientific researches on the topic of study was conducted through Aca-demic Search Elite (EBSCO), PubMed, Science Direct, and Physiotherapy Evidence Da-tabase (PEDro).13 literatures were gathered after screening of the studies found from all the databases used. And the findings were summarized according to PICO model. This study found hemiplegic stroke as the biggest indication of PNF in neuromuscular rehabilitation.

Hilde M. Feys, et al (2012), conducted a single-blind, randomized, controlled multicenter trial study to determine the effect of proprioceptive neuromuscular facilitation on gait in patients with hemiplegia. 100consecutive patients were allocated to either an experimental group that received an additional treatment of proprioceptive neuromuscular facilitation or to a control group. The intervention was applied for 6 weeks. Patients were evaluated for level of impairment (Brunnström-Fugl-Meyer test). Patients in the experimental group performed better on the Brunnström-Fugl-Meyer test than those in the control group throughout the study period, but differences were significant only at follow-up.

Ribeiro.T, et al (2012), conducted a comparative study to compare the effects of the treadmill training with partial body-weight support and Proprioceptive Neuromuscular Facilitation method on gait of patients with chronic hemiplegia. Randomized clinical trial, comparing two experimental groups;done in the Laboratory for Human Movement Analysis on Twenty-three patients, able to walk with personal assistance or assistive devices. Two experimental groups underwent gait training based on PNF method (N.=11) or using the TPBWS (N.=12), for twelve sessions. Evaluation of motor function and kinematic gait analysis were carried out before and after the interventions. Differences between groups were observed only for the maximum ankle dorsiflexion over the swing phase, which showed an increase for the PNF group.

Pizzi A, etal (2011), conducted a study on, "Effect of PNF Technique on Gait Parameters among Hemiplegic Patients" in Department of Neuro rehabilitation, Italy. Fifty six hemiplegic outpatients, more than 12 months hemiplegic stroke, continuously admitted in a rehabilitation centre. Patients were videotaped while walking at a comfortable speed. Quantitative and clinical gait parameters were derived from videotaped walking tasks at admission and at the end of a period of rehabilitation training. Qualitative features were assessed using the Wisconsin Gait Scale. After training, the median Wisconsin Gait Scale score improved significantly, in particular, "weight shift to paretic side" and patterns during the swing phase of the affected leg were improved. Gait velocity and stride length increased significantly, whereas number of steps, stride period, and stance period of the unaffected side were reduced.

Youdas J.W, et al (2010),conducted a study on, "the efficacy of two modified proprioceptive neuromuscular facilitation stretching techniques in subjects with hemiplegia" in Mayo Clinic, Minnesota, USA. Difference scores in knee extension angle and electro myographic (EMG) quantified before and after modified proprioceptive neuromuscular facilitation (PNF) hold-relax (HR) and hold-relax-antagonist contraction (HR-AC)stretching procedures in 35 hemiplegic paients with reduced hamstring muscle length bilaterally (knee extension angle <160 degrees). Participants were randomly assigned each PNF procedure to opposite lower extremities. Knee extension values were measured by using a goniometer. On average the 10-second modified HR procedure produced an 11 degrees gain in knee extension angle within a single stretch session.

Ryan E.E,(2008), conducted a study to investigate the effects of the contract-relax-antagonist-contract (CRAC) form of proprioceptive neuromuscular facilitation (PNF) stretching, on postural stability in College of Nursing and Health Sciences, Florida. Thirty hemiplegic patientsof short duration, were randomly assigned to 1 of 3 conditions: warm-up and stretch (WS), stretching only (SO), and a control condition (CON). Measures of anterior/posterior and medial/lateral (M/L) postural stability were taken before and after treatment conditions. Analysis of variance was used to assess for differences between conditions. This study suggested that CRAC PNF stretching improves Medial/Lateral stability.

Sharman M.J, Cresswell A.G, and Riek S, (2006), conducted a study on, "Proprioceptive neuromuscular facilitation stretching, mechanisms and clinical implications among hemiplegics" in The University of Queensland, Brisbane, Australia. Proprioceptive neuromuscular facilitation (PNF) stretching techniques are

commonly used in the clinical environments to enhance both active and passive range of motion (ROM) for hemiplegics with a view to optimizing motor performance and rehabilitation. PNF stretching is positioned in the literature as the most effective stretching technique particularly in respect to short-term changes in ROM. The inclusion of a shortening contraction of the opposing muscle appears to have the greatest impact on enhancing ROM. The superior changes in ROM were that PNF stretching often produces compared with other stretching techniques has traditionally been attributed to autogenic and/or reciprocal inhibition.

Zenobia C. et al (2006), conducted a study on, "Gait Training of Patients with hemiplgia using proprioceptive neuromucular facilitation" in University of Technology, Sydney, Australia.Two individuals with stroke related hemiplegia of less than 6 weeks' duration participated in a 4-week gait training program as an adjunct to physical therapy received at a hospital. After the 4-week intervention, both patients were discharged from the hospital, and they returned after 6 months for a follow-up evaluation.In the 6-month follow-up evaluation, both patients continued to have improvements in all outcome measures. This case report shows that, following the use of proprioceptive neuromucular facilitation, patients after acute hemiplegia had improvements in gait performance, functional activities, balance, and motor control in the long term.

Wang R.Y, (2003), conducted a study on, "Effect of proprioceptive neuromuscular facilitation on the gait of patients with hemiplegia of long and short duration" in Department of Physical Therapy, National Yang-Ming Medical College, Taiwan. The subjects were 20 patients with hemiplegia of short duration (mean =4.4 months, n = 10) or long duration (mean = 15.4months, n = 10). Each subject received

a total of 12 sessions of PNF, with each treatment lasting for 30 minutes. In subjects with hemiplegia of short duration, gait speed and cadence improved immediately after 1 session of PNF, and this improvement was further enhanced after 12 treatments.

CHAPTER III

RESEARCH METHODOLOGY

Research methodology refers to the techniques used to structure a study and together and analyse information in a systemic fashion (**Polit&Hungler, 2008).** Methodology includes the steps, procedure and strategies for gathering and analyzing the data in the research investigation.

This chapter consists of research approach, research design, variables, setting, population, sample, sample size, sampling technique, criteria for selection of sample, development and description of the tool, content validity, reliability, pilot study, data collection procedure and plan for data analysis.

RESEARCH APPROACH

Quantitative research approach was adopted for this study. Quantitative researchis the research based on traditional scientific methods, which generates numerical data and usually seeks to establish causal relationships between two or more variables, using statistical methods to test the strength and significance of the relationships.

RESEARCH DESIGN

The research design used in this study was quasi experimental pre and posttest control group design.

GROUP	PRETEST	INTERVENTION	POSTTEST
Experimental group	O1	X	O2
Control group	O1	-	O2

Figure 2: Schematic representation of quasi experimental design

Key:

O1-Pretest level of gait among experimental and control group.

O2-Posttest level of gait among experimental and control group.

X-Administration of proprioceptive neuromuscular facilitation exercises to the experimental group.

VARIABLES

Independent Variable : Proprioceptive neuromuscular facilitation exercises.

Dependent Variable : Improvement in gait.

SETTING OF THE STUDY

The setting of the study refers to the area where the study was conducted. The study was conducted in three multi-specialtyhospitals in Tirunelveli district. In that, Shifa hospital and peace health center were selected as experimental group and Galaxy hospital was selected as control group.

Shifa hospital is a 150 bedded hospital situated at Tirunelveli. It comprises of various functioning departments like IMCU, ICCU and surgical unit. Mainly they have adequate bedded wards and an operation theatre. It has a separate emergency department.

Peace health center is a 100 bedded hospital situated at Tirunelveli new bus stand. The hospital includes medical ward, surgical ward, IMCU, ICCU, and Physiotherapy department. The hospitals have separate Operation theatre and emergency department. Availability of samples was the main reason to choose these settings to conduct the study.

Galaxy hospital is a 150 bedded multispecialty hospital situated at Tirunelveli. It comprises various functioning departments like IMCU, ICCU and surgical units. Many stroke patients were admitted here for treatment.

POPULATION

The population of the study was the patients affected by hemiplegia with the age group of 31 – 60years in selected hospitals at Tirunelveli.

SAMPLE

Samples consist of hemiplegic patients aged 31 – 60 years, who fulfill the inclusive criteria in selected hospitals like Shifa hospital, Peace health center and Galaxy hospital at Tirunelveli.

SAMPLE SIZE

Sample size for the study was 60. Among 60 samples, 30 hemiplegic patients were in experimental group and another 30 hemiplegic patients were in control group based on the inclusive criteria.

SAMPLING TECHNIQUE

Non probability purposive sampling technique was used to select the study samples.

Step 1: The investigator selected two multi-specialty hospitals, Shifa hospital and Peace health center to select experimental group. Total bed strength of Shifa hospital is 150. Nearly five to sixhemiplegic patients used to come for treatment each week.Forty one hemiplegic patients in theage group of 31-60 years present during data collection period. Total bed strength of Peace health center is 100.Every week 4 to 5 hemiplegic patients used to come for treatment and 33 hemiplegic patients in the age group of 31-60 years were present during data collection period. Out of that, the

investigator selected 30 samples for the experimental group. The samples that fulfilled the inclusive criteria were selected by using purposive sampling technique.

Step 2: The investigator selected Galaxy, amultispecialty hospital, in Tirunelveli for control group. The total bed strength of Galaxy hospital is 150,Every week 5 to 6 hemiplegic patients used to come for treatment, fifty two hemiplegic patientsaged 31-60 years were present during data collection period. Among that the investigator selected 30 hemiplegic patientsfor the control group. The samples that fulfilled the inclusive criteria were selected by using purposive sampling technique.

CRITERIA FOR SAMPLE SELECTION

The sample was collected on the basis of inclusive criteria.

Inclusion criteria

- Hemiplegic patients with the age group of 31 to 60 yrs of age.
- Hemiplegic patients admitted with first acute attack.
- Patients affected with hemiplegia for short duration (0-4months).
- Conscious, oriented hemiplegic patients.
- Hemiplegic patients those who were able to stand.
- Hemiplegic Patients who were admitted in selected hospitals at Tirunelveli.
- Hemiplegic patients those who were receiving physiotherapy.
- Hemiplegic patients those who were willing to participate.
- Hemiplegic Patients who understood Tamil and English.

Exclusion criteria

- Patients having hemiplegia due to other neurological disorders like Parkinsonism and Cerebral palsy.

- Hemiplegic patients who were undergoing alternative therapies like massaging reflexology etc.
- Hemiplegic patients those who were not willing to participate.
- Hemiplegic patients who were mentally challenged.
- Hemiplegic patients who had ulcers or wounds in affected extremity.

DEVELOPMENT AND DESCRIPTION OF THE TOOL

The tool was developed after extensive review of literature, internet search and expert opinion helped the investigator to select the suitable scale to assess the level of gait among hemiplegic patients. The tool has two sections, section-A and section-B.

SECTION-A - DEMOGRAPHIC VARIABLES

It consists of a structured interview schedule. It has questions related to demographic data of the hemiplegic patients. It consists of total 10 items such as age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness.

SECTION B: MODIFIED WISCONSIN GAIT SCALE

The gait was assessed by modified Wisconsin gait scale. The Scale was a formally validated scale to the quality of instruments and the researcher modified it according to the nature of her study. It consists of 14 items related to the gait impairment such as use of handheld gait aid, Stance time on impaired side, Step length of unaffected side, weight shift to the affected side, stance width, guardedness, hip extension of affected side, external rotation during initial swing, Circumduction on mid swing, hip hiking at mid swing, toe clearance, pelvic rotation at terminal swing and initial foot contact.

SCORING PROCEDURE

SECTION B: MODIFIED WISCONSIN GAIT SCALE

Research tool has 14 items. The total score of the rating was 45. The lowest score indicates normal gait and the highest score indicates severe gait impairment. In this 14 rates were marked as “0” score, 15 to 25 rates were marked as “1” score, 26 to 35 rates were marked as “2” score, 36 to 45 rates were marked as “3” score. The total score was 3. It was interpreted as follows;

Scoring Key:

S.NO	DESCRIPTION	RATE	SCORE
1.	Normal gait	14	0
2.	Mild gait impairment	15 to 25	1
3.	Moderate gait impairment	26 to 35	2
4.	Severe gait impairment	36 to 45	3

DESCRIPTION OF INTERVENTION

The researcher has applied Proprioceptive neuromuscular facilitation exercises. Proprioceptive neuromuscular facilitation is a method of stretching muscles to maximize their flexibility and is performed by the researcher and that involves a series of contractions and relaxations. Proprioceptive neuromuscular facilitation mixes voluntary and involuntary contraction to help in the improvement of function of the affected extremity. Exercises were done on both upper and lower extremities.

Pre exercise instruction:

- Explained the procedure and made the patient to lie in supine position on a firm comfortable surface or on the bed. Taught the importance of

proprioceptive neuromuscular facilitation exercises and its effect on hemiplegic gait.

- Explained the exercise sequences to the patient.
- The researcher extended the patient's arm or leg to the point until there wasa slight discomfort.
- The researcher has held the stretch for 5 seconds then released.
- The arm or leg was then pushed in toward the body and held for 5 seconds.
- The stretch was released to the extended position and held for another 5 seconds.

Steps of exercises:

Upper extremity

- Flexion – abduction – external rotation.
- Extension – adduction – internal rotation.
- Flexion – adduction – internal rotation.
- Extension – abduction – external rotation.

Lower extremity

- Flexion – abduction – external rotation.
- Extension – adduction – internal rotation.
- Flexion – adduction – internal rotation.
- Extension – abduction – external rotation.

Post exercise instruction:

- Ten repetition ofeach pattern was done before proceeding to the next pattern.
- Exercises weredone 30 minutes two times in a day for 6 days.
- Instructed the patient to go for a walk around the bed for 2 to3 minutes.

CONTENT VALIDITY

The content validity of the tool was established on the basis of opinion of one medical expert in the Field of medicine and four nursing experts in the field of medical and surgical nursing. Slight modification was done as per the suggestion of the experts in the tool.

RELIABILITY

Reliability of the tool was tested by the investigator and other nursing experts. The reliability of the tool was determined by test-retest method. The reliability score was r=0.92. Hence the tool was considered highly reliable for proceedings for this study.

PILOT STUDY

It was a rehearsal for the main study. The researcher got permission from the Principal, research ethical committee and HOD in medical surgical nursing of Sri.K. Ramachandran Naidu College of Nursing. A formal permission was obtained from the managing director of Shifa hospital,Tirunelveli.The data was collected from 24-07-2013 to 31-07-2013.

The total bed strength of Shifa hospital is 150; Every week 5 to 6 hemiplegic patients used to come for treatment. Patients with hemiplegia in the age group of 31-60 years were 10 during the pilot study period. In that the investigator selected 3 samples for the experimental group and 3 samples for the control group who have fulfilled the inclusive criteria by using purposive sampling technique.

The pretest level of gait was assessed by using modified Wisconsin gait scale for both experimental and control group. Rapport was established with the patients and a brief introduction about the study was given. Consent was obtained from each

patients and reassurance was provided that the collected data would be kept confidential. The data related to demographic variables was collected from the samples.

The researcher applied thirty minutes proprioceptive neuromuscular facilitation exercises for two times a day for six days to the experimental group and control group did not receive the intervention. The posttest was done for the both experimental and control group by using modified Wisconsin gait scale. The data were analyzed and the results of the pilot study showed that the experimental group had a improvement in gait level as compared to the control group. The study was found to be feasible and hence the same procedure was decided to follow in the main study. The samples selected for the pilot study were not included for the main study.

PROCEDURE FOR DATA COLLECTION

The researcher gotformal permission from The Principal and The research ethical committee of Sri. K. Ramachandran Naidu College of Nursing and The HOD of the medical surgical nursing. The investigator selected three multispecialty hospitals for conducting the study. Before the data collection formal permission was obtained from the medical officer and management of Shifa hospital, Peace health center and Galaxy hospital at Tirunelveli. In those, two hospitals, Shifa hospital and Peace health center were selected for experimental group and Galaxy hospital was selected for control group. The data was collected from 01-08-2013 to 31-08-2013, from 8am to 6pm.

Phase I - Selection of samples:

The non-probability purposive sampling technique was adopted for the study. Shifa hospital is a 150 bedded hospital situated at Tirunelveli.Everyweek 5 to

6hemiplegic patients used to come for treatment. Forty one hemiplegic patients in the age group of 31 to 60 years were present during data collection period.The investigator selected 15 samples by using purposive sampling technique,those who fulfilled inclusive and exclusive criteria.

Peace health center is a 100 bedded hospital situated at Tirunelveli new bus stand. Availability of samples and cooperative environment was the main reason to choose this setting to conduct the study.Every week approximately 4 to 5 hemiplegic patients used to come for treatment. Thirty three hemiplegic patients in the age group of 31 to 60 years were present during data collection period. The investigator selected 15 samples by using purposive sampling technique, those who fulfilled inclusive and exclusive criteria.

The investigator selected Galaxy, a multispecialty hospital, in Tirunelveli for control group. The total bed strength of Galaxy hospital is 150,Every week 5 to 6 hemiplegic patients used to come for treatment. Fifty two hemiplegic patients aged 31-60 years were present during data collection period. Among that the investigator selected 30 samples for the control group. The samples those who fulfilled the inclusive criteria were selected by using purposive sampling technique. **Phase II - Preassessment of the level of gait:**

The pretest level of gait was assessed by using modified Wisconsin gait scale for both experimental and control group. Rapport was established with the patients and a brief introduction about the study was given. An oral consent was obtained from each patients and reassurance was provided that the collected data would be kept confidential. The data related to demographic variables were collected from the samples.

Phase III - Application of proprioceptive neuromuscular facilitation exercises for experimental group:

The researcher applied thirty minutes of proprioceptive neuromuscular facilitation exercises to the experimental group for two times in a day for 6 daysand control group did not receive the intervention.

Phase IV - Post assessment of level of gait for experimental and control group:

The posttest level of gait for experimental group and control group was assessed by using modified Wisconsin gait scale. Data collection was analyzed by using both descriptive and inferential statistics. Analysis revealed that there was a significant improvement on the level of gait among hemiplegic patients in the experimental group; and there was no significant improvement in the level of gait among patients with hemiplegia in the control group.

PLAN FOR DATA ANALYSIS

After the data collection, data were organized, tabulated, summarized and analyzed. The data were analyzed according to objectives of the study by using both descriptive and inferential statistics.

DESCRIPTIVE ANALYSIS

- Frequency and percentage distribution was used to analysis the demographic variables among hemiplegic patients in experimental and control group.
- Frequency and percentage distribution was used to assess the pre and posttest level of gait among hemiplegic patients in experimental and control group.

- Mean and standard deviation were used to assess the effectiveness of propr ioceptive neuromuscular facilitation in improving gait.

INFRENTIAL STATISTICS

- Unpaired‘t’ test was used to compare pre and posttest of level of gait among hemiplegic patients in experimental group and control group.
- Paired‘t’ test was to compare pre and posttest of level of gait among hemiplegic patients in experimental group.
- Chi-square was used to find out association of the effectiveness of proprioceptive neuromuscular facilitation in improving gait among hemiplegic patients in experimental and control group with their selected demographic variables.

PROTECTION OF HUMAN SUBJECTS

Research proposal was approved by the dissertation committee, prior to the pilot study and main study. Permission was obtained from the head of the department of Medical Surgical Nursing, Sri. K. Ramachandran Naidu College of Nursing, Sankarankovil.Permission was sought from Director of selected hospitals (Shifa hospital, Peace health centre and Galaxy hospital). An oral consent from each individual was obtained before data collection. Assurance was given to the study participants regarding the confidentiality of the data collected.

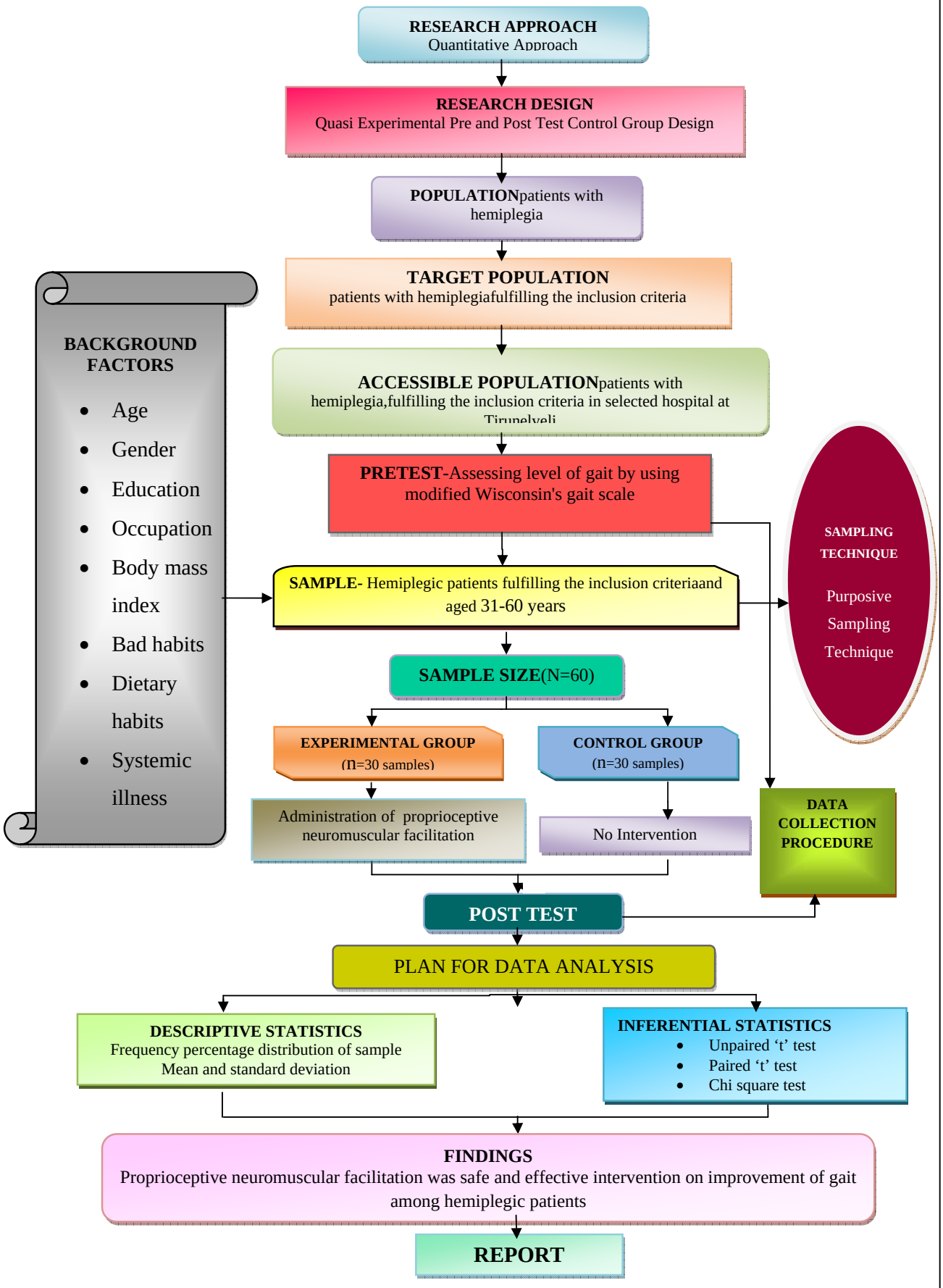

Figure 3: Schematic Representation of Research Methodology

CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

This Chapter deals with the analysis of the data interpretation of the data collected from the samples to assess the effectiveness of proprioceptive neuromuscular facilitation on the improvement of gait among hemiplegic patients.

Analysis is the method of organizing scrutinizing and sorting the data in such a way that research questions can be answered **[polit, Hungler (2009)].**

The purpose of analysis is to find out the effectiveness so that the relation of the problem can be tested.

The analysis and interpretation of data is based on data collection the results are computed by using descriptive (mean, Frequency, percentage distribution and standard deviation) and inferential ('t'- test and chi square test) statistics. The data has been tabulated and organized as follows:

ORGANIZATION OF DATA

Section I :Assessment of demographic variables of the patients with hemiplegia.

- Frequency and Percentage distribution of samples based on demographic variables.

Section II :Assessment of the level of gait among patients with hemiplegia in the experimental and control group.

- Frequency and percentage distribution of pre and posttest level of gait among hemiplegic patients in experimental group
- Frequency and percentage distribution of pre and posttest level of gait among hemiplegic patients in control group

Section III :Comparison of level of gait among patients with hemiplegia in experimental and control group

- Comparison of pretest level of gait between hemiplegic patients in experimental and control group
- Comparison of posttest level of gait between hemiplegic patients in experimental and control group
- Comparison of pre and posttest level of gait among hemiplegic patients in experimental group

Section IV:Association of posttest level of gait among patients with hemiplegia in experimental and control group with the selected demographic variables

- Association of posttest level of gait among hemiplegic patients in experimental group with the selected demographic variables.
- Association of posttest level of gait among hemiplegic patients in control group with the selected demographic variables.

PRESENTATION OF DATA

SECTION I:

ASSESSMENT OF DEMOGRAPHIC VARIABLES OF PATIENTS WITH HEMIPLEGIA

TABLE 1: Frequency and percentage distribution of the samples based on demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits,andsystemic illness.

(N=60)

S.No	Demographic variables	Experimental group		Control group	
		f	%	f	%
1	**Age**				
	a)31-40 Years	6	20	5	16.7
	b) 41-50 Years	10	33.3	9	30
	c) 51-60 Years	14	46.7	16	53.3
2	**Gender**				
	a)Male	22	73.7	21	70
	b)Female	8	26.7	9	30
3	**Education**				
	a)No formal education	4	13.3	7	23.3
	b)Primary	5	16.7	6	20
	c) Secondary	6	20	6	20
	d) Higher secondary	8	26.7	6	20
	d)Under graduate	3	10	2	6.7
	e)Post graduate	4	13.3	3	10
4	**Occupation**				
	a)Sedentary Worker	9	30	15	50
	b)Moderate Worker	14	46.7	10	33.3
	c)Heavy Worker	7	23.3	5	16.7

Table 1 continues……

S.No	Demographic variables	Experimental group		Control group	
		f	%	f	%
5	**Body Mass Index**				
	a) <18	1	3.33	2	6.7
	b)18 - 24	5	16.7	9	30
	c)25 - 30	15	50	13	43.3
	d)>35	9	30	6	20
6	**Bad habits**				
	Yes	14	46.7	19	63.3
	No	16	53.3	11	36.7
7	**Dietary habits**				
	a)Vegetarian	5	16.7	3	10
	b)Non vegetarian	25	83.3	27	90
8	**Systemic illness**				
	a)Diabetes mellitus	4	13.3	8	26.7
	b)Hypertension	14	46.7	12	40
	c)Both diabetes and hypertension	7	23.3	7	23.3
	d) Other illnesses	3	10	1	3.3
	e)None	2	6.7	2	6.7

Table 1 denotes the frequency and percentage distribution of the samples based on demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habitsand systemic illnessin the experimental and control group.

While considering the age, in the experimental group out of 30 patients, 6(20%) of them were between the age group of 31-40 years, 10(33.3%) of patients belongs to41-50years and 14(46.7%) of patients belongs to 51-60 years whereas in

the control group out of 30 patients 5(16.7%) of them were between the age group of 31-40 years, 9(30%) of patients belongs to them 41-50years and 16(53.3%) of patients belongs to 51-60 years.

With regard to gender in the experimental group, out of 30 patients, 22(73.3%) of the samples were males and 8(26.7%) of them were females, whereas in the control group out of 30 patients 21(70%) of them were males and 9(30%) of patients were females.

Based on the education in the experimental group out of 30 patients, 4(13.3%) of them were had no formal education, 5(16.7%) of them had primary school education, 6(20%) of them had secondary school education, 8(26.7%) of them had higher secondary education, 3(10%) of them had under graduation, 4(13.3%) of them had post graduation. Whereas in the control group out of 30 patients, 7(23.3%) of them were had no formal education, 6(20%) of them had primary school education, 6(20%) of them had secondary school education, 6(20%) of them had higher secondary education, 2(6.7%) of them had under graduation and 3(10%) of them had post graduation.

In relation with occupation in the experimental group among the 30 patients with hemiplegia, 9(30%) of them were sedentary workers, 14(46.7%) of them were moderate workers, 7(23.3%) of them were heavy workers, whereas in the control group out of 30 patients, 15(50%) of them were sedentary workers, 10(33.3%) of them were moderate workers and 5(16.7%) of them were heavy workers.

With regard to their body mass index (BMI) in the experimental group, outof30 patients, 1(3.33%) of them had <18 BMI, 5(16.7%) of them had 18 - 24BMI, 15(50%) of them had 25 - 30BMI, and 9(30%) of them had>35BMI. Whereas in

control group 2(6.7%) of them had <18 BMI, 9(30%) of them had 18 - 24BMI, 13(43.3) of them had 25 - 30BMI and 6(20%) of them had >35BMI.

Regarding the bad habits, in the experimental group out of 30 patients, 14(46.7%) of them were having bad habits, 16(53.3%) of them did not have any bad habits, where as in control group out of 30 patients, 19(63.3%) of them were having bad habits and 11(36.7%) of them did not have any bad habits.

With regard to dietary habits, in the experimental group out of 30 patients, 5(16.7%) of patients were vegetarian and 25(83.3%) of patients were non-vegetarian, whereas in the control group out of 30 patients 3(10%) of patients were vegetarian and 27(90%) of them were non vegetarian.

Regarding thesystemic illnessin the experimental group out of 30 patients, 4(13.3%) of them having diabetes mellitus, 14(46.7%) of them having hypertension, 7(23.3%) of them having both diabetes mellitus and hypertension, 3(10%) of them having other diseases, 2(6.7%) of them having no systemic illness, whereas in the control group out of 30 patients, 8(26.7%) of them having diabetes mellitus, 12(40%) of them having hypertension, 7(23.3%) of them having both diabetes mellitus and hypertension, 1(3.3%) of them having otherillnesses, 2(6.7%) of them having no systemic illness.

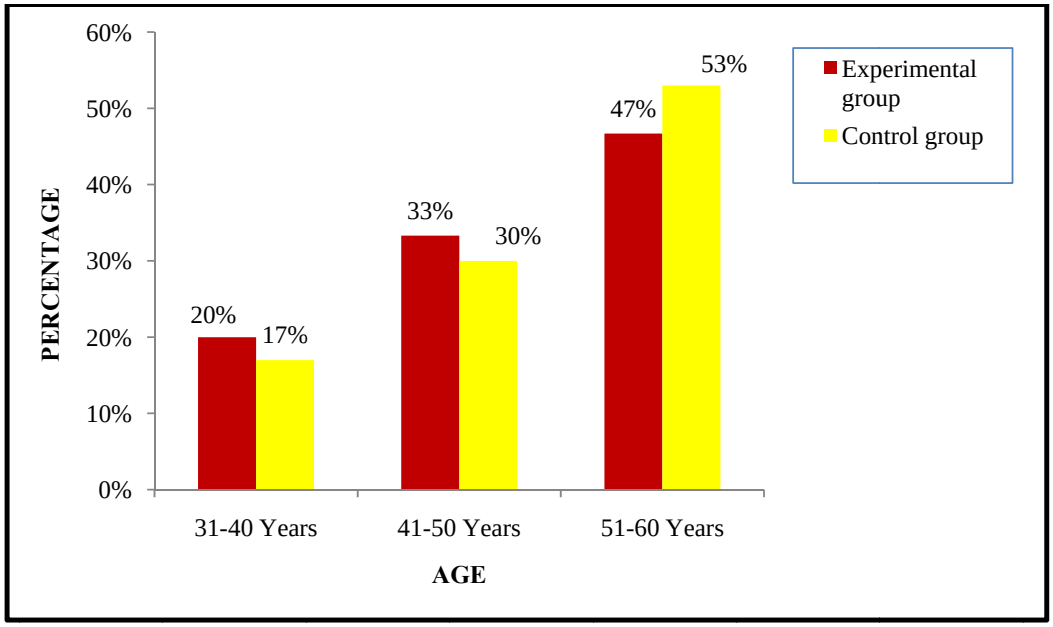

Figure 4: Distribution of sample according to age

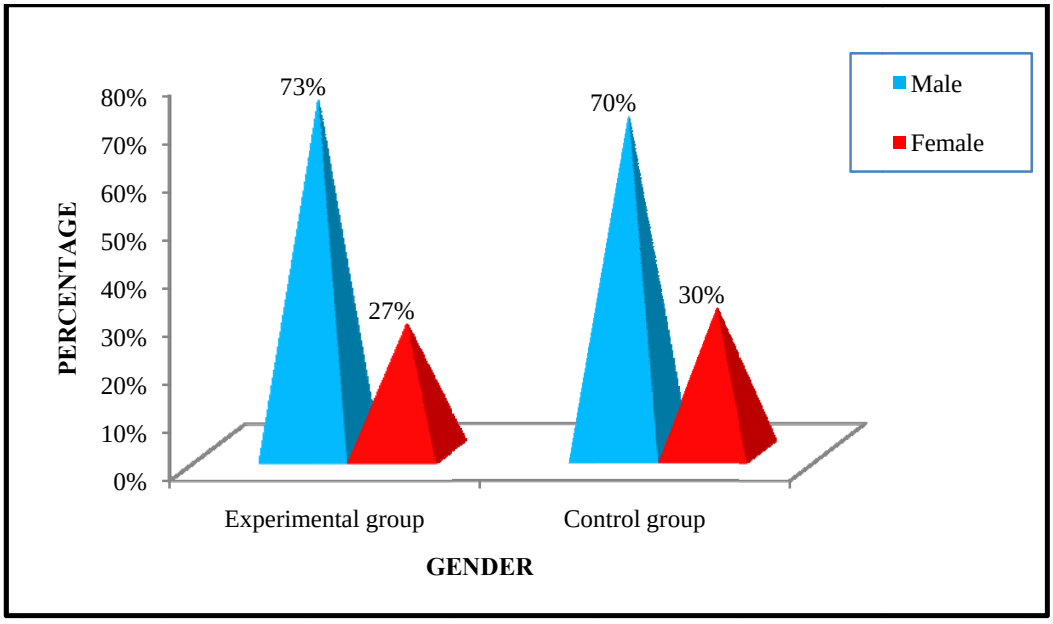

Figure 5: Distribution of sample according to gender.

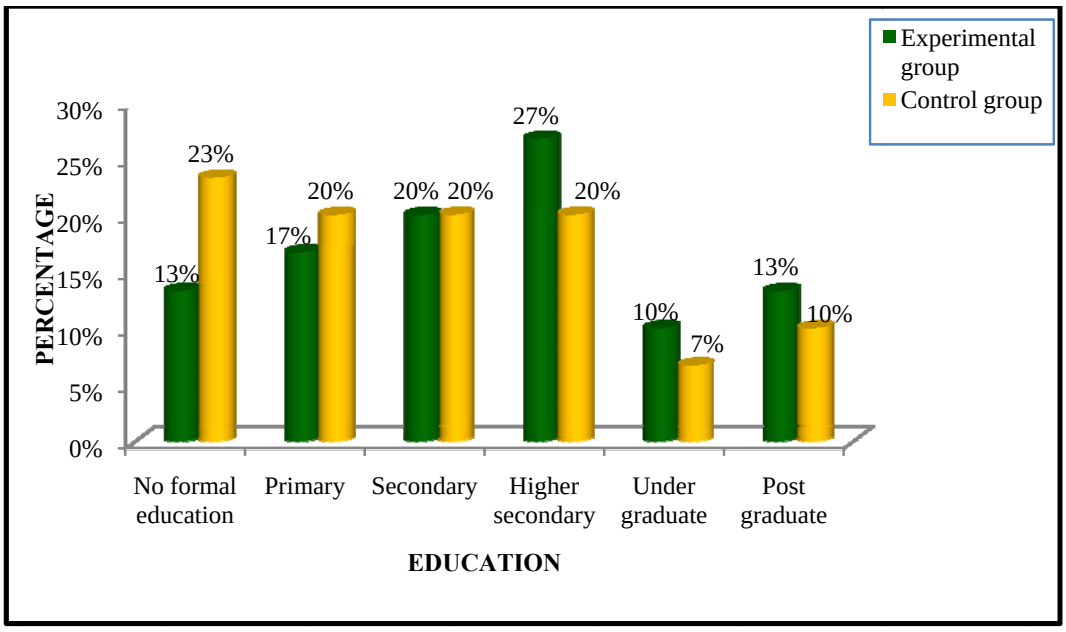

Figure 6: Distribution of sample according to education.

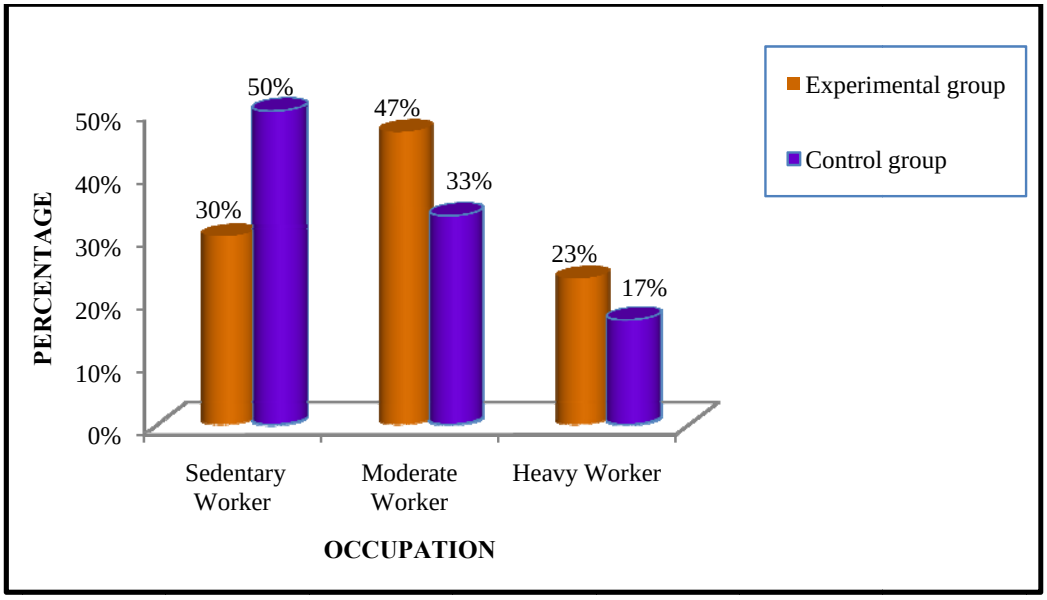

Figure 7: Distribution of sample according to occupation.

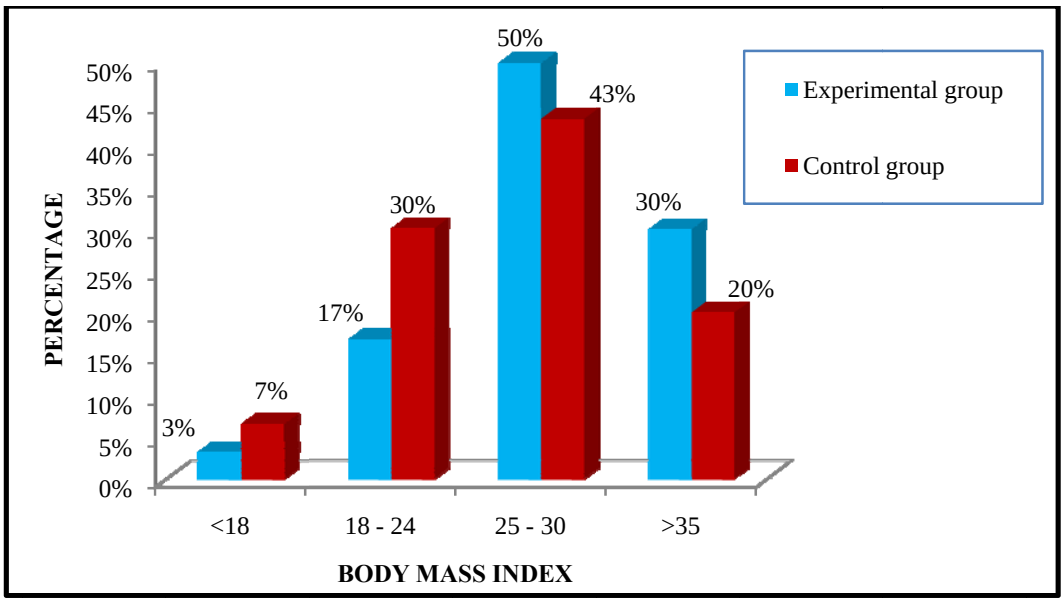

Figure 8: Distribution of sample according to their body mass index.

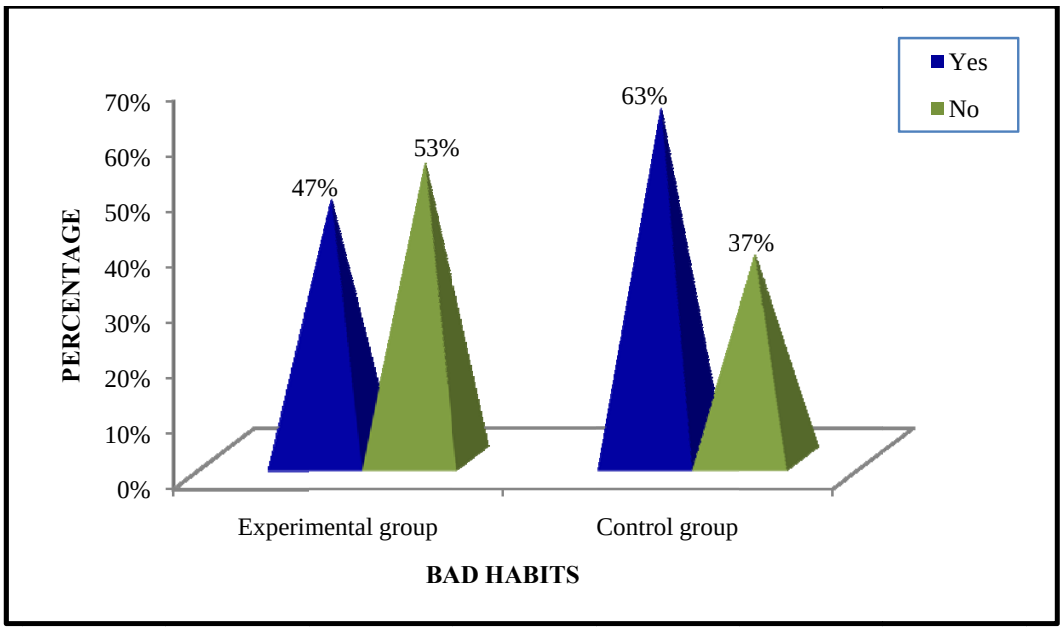

Figure 9: Distribution of sample according to bad habits.

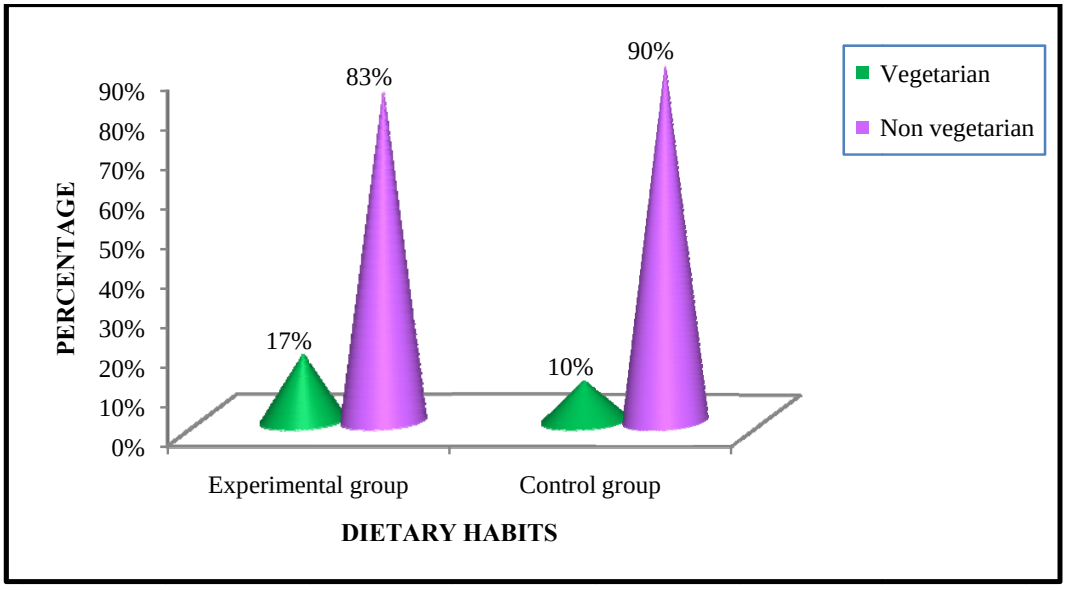

Figure 10: Distribution of sample according to dietary habits.

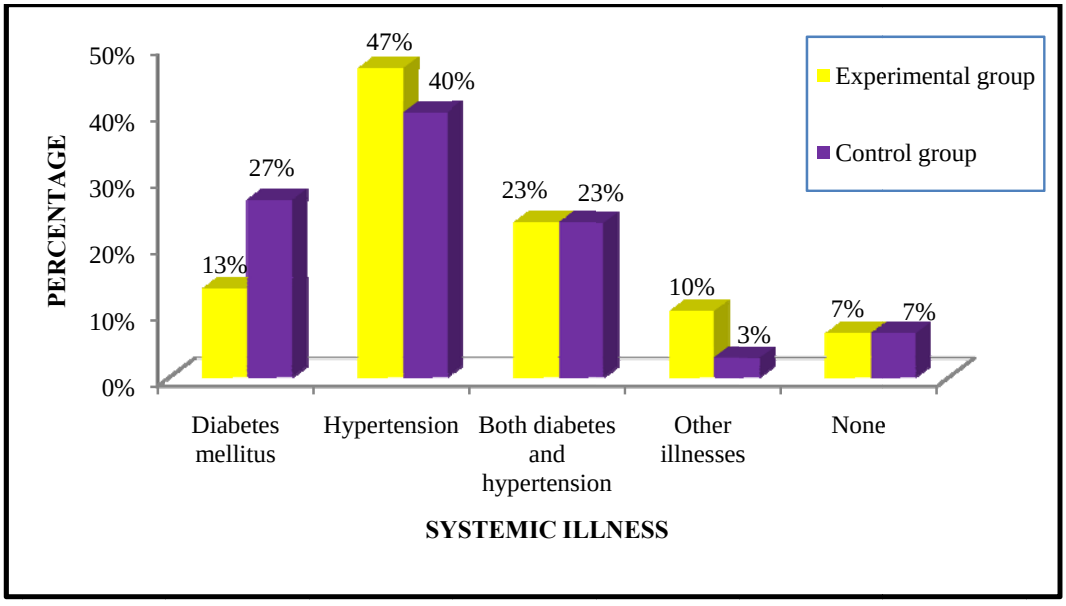

Figure 11: Distribution of sample according to systemic illness.

SECTION: II

ASSESSMENT OF THE LEVEL OF GAIT AMONG PATIENTS WITH HEMIPLEGIAIN EXPERIMENTAL AND CONTROL GROUP

Table 2: Frequency and percentage distribution of pretestlevel of gait among patients with hemiplegia in experimental and control group

(N=30)

S.No	Group	Normal gait		Mild gait impairment		Moderate gait impairment		Severe gait impairment	
		f	%	f	%	f	%	f	%
1	Experimental group	-	-	-	-	12	40	18	60
2	Control group	-	-	-	-	11	36.66	19	63.33

Table 2 reveals the frequency and percentage distribution of pretestlevel of gait among experimental group and control group. It is evident from the above table that in the pretest level of gait among the experimental and control group, none of the patients had normal gait, none of the patients had mild gait impairment,12(40%) of the patients had mild gait impairment,18(60%) of the patients had severe gait impairment in experimental group,none of the patients had normal gait, none of the patients had mild gait impairment,11(36.66%) of the patients had mild gait impairment,19(63.33%) of the patients had severe gait impairment in control group.

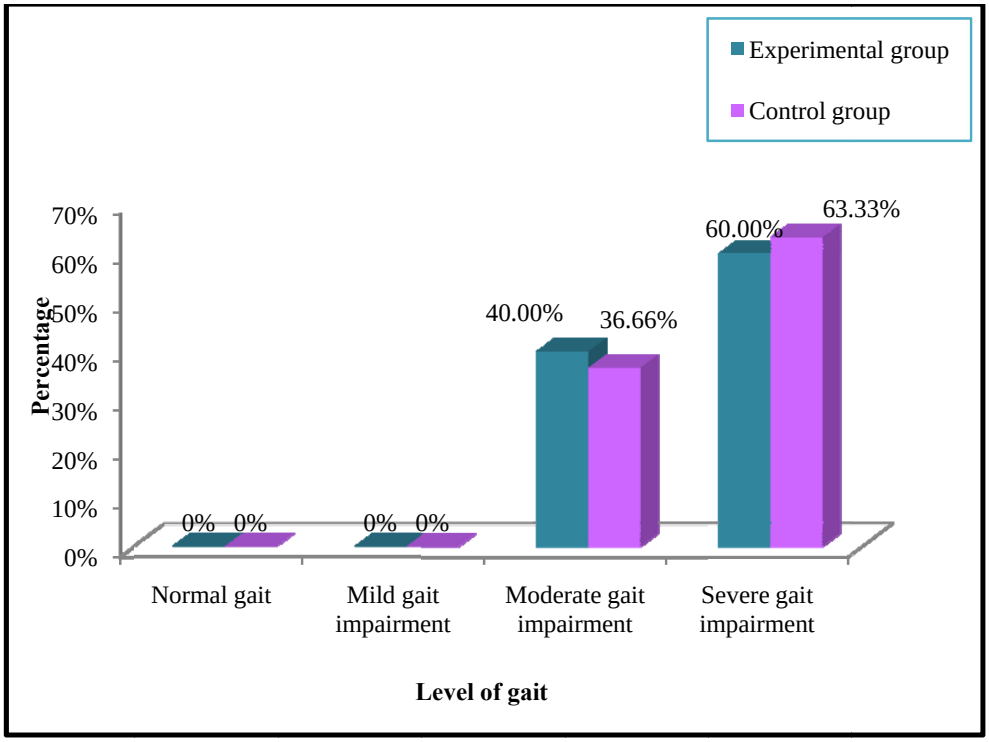

Figure 14: Frequency and percentage distribution of pretestlevel ofgait among patients with hemiplegia in experimental and control group.

Table 3: Frequency and percentage distribution ofposttest level of gait amongpatients with hemiplegic inexperimental and control group

(N=30)

S.No	Group	Normal gait		Mild gait impairment		Moderate gait impairment		Severe gait impairment	
		f	%	f	%	f	%	f	%
1	Experimental group	-	-	14	46.66	16	53.33	-	-
2	Control group	-	-	-	-	13	43.33	17	56.66

Table 3 reveals the frequency and percentage distribution of posttestlevel of gait among experimental group and control group. It is evident from the above table that in the posttest level of gait among the experimental and control group, none of the patients had normal gait,14(46.66%) of the patients had mild gait impairment,16(53.33%) of the patients had moderate gait impairment, none of the patients had severe gait impairment in the experimental group, none of the patients had normal gait,none of the patients had mild gait impairment, 13(43.33%) of the patients had moderate gait impairment,17(56.66%) of the patients had severe gait impairment in the control group.

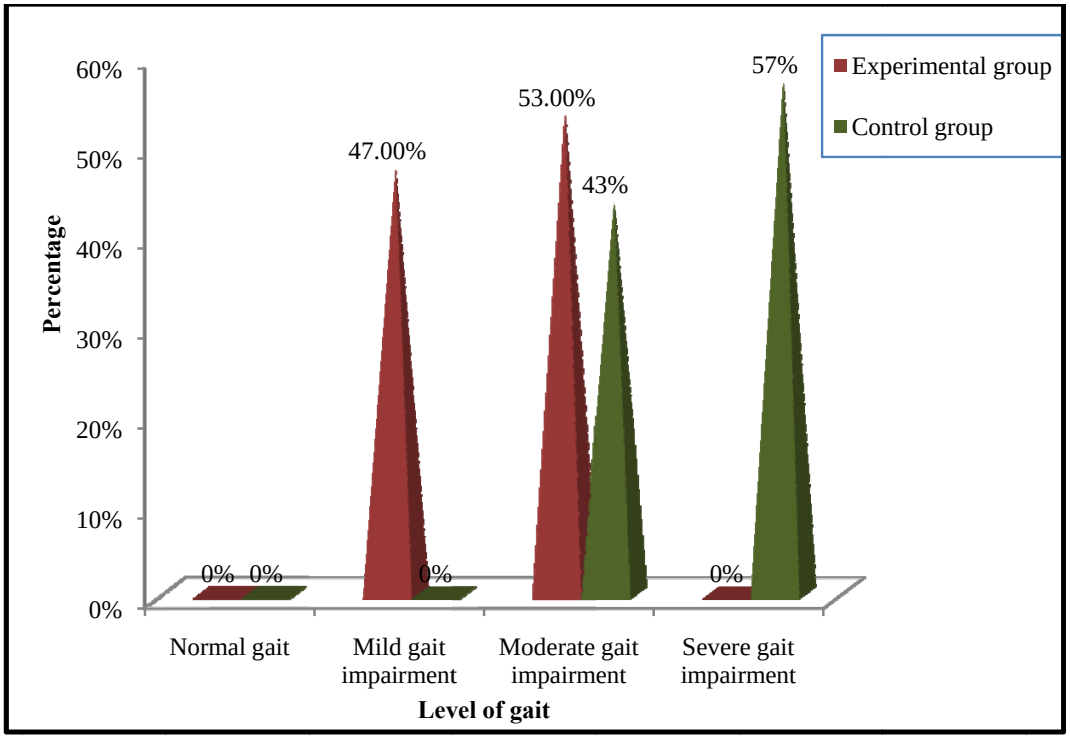

Figure 15: Frequency and percentage distribution of posttestlevel of gait among patients with hemiplegia in experimental and control group.

SECTION III

COMPARISON OF LEVEL OF GAIT AMONGHEMIPLEGIC PATIENTS BETWEEN EXPERIMENTAL GROUPAND CONTROL GROUP

Table 4: Comparison of mean pretest level of gaitamong hemiplegic patients between the experimental and control group

(N=60)

S.No	Group	Mean	Standard Deviation	't' Value
1	Experimental group	2.62	0.49	0 NS
2	Control group	2.63	0.5	0 NS

NS = Non Significant.

Table 4 reveals the unpaired `t' test to compare the pretest level of gait between experimental and control group it was found that the `t' value was 0, indicating that there is no significant difference in pretest level of gait between the experimental and control group at $p<0.05$ level.

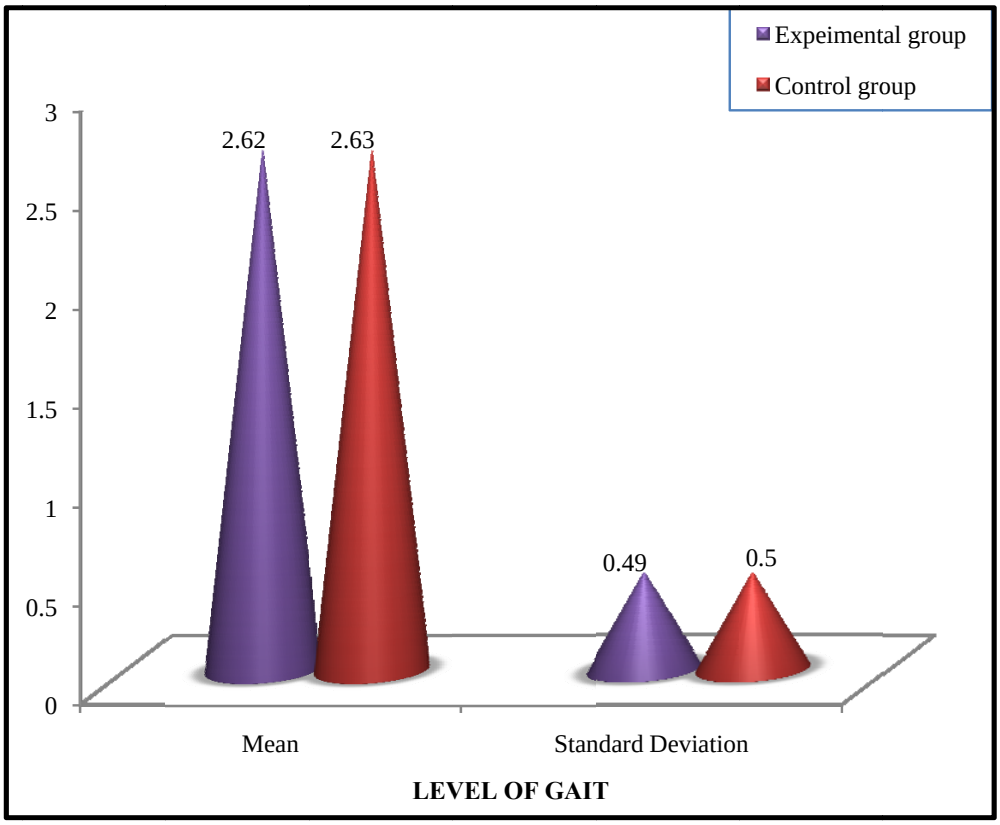

Figure 16: Comparison of pretest level of gait amonghemiplegic patients between experimental and control group.

Table 5: Comparison of posttest level of gaitamong hemiplegic patients between the experimental and control group

(N=60)

S. No	Level of gait	Mean	Standard Deviation	t Value
1	Experimentalgroup	1.63	0.49	7.16 S
2	Control Group	2.51	0.5	

S = Significance

Table 5 reveals the unpaired `t' test to compare the posttest level of gait between experimental and control group it was found that the 't' value was 7.16 indicating that there is more significant difference in post test level of gait between the experimental and control group at $p<0.05$ level.The stated research hypothesis was,"the mean post test level of gaitamong patients with hemiplegia in experimental group will be significantly higher than the mean post test level of gait in control group."Hence the research hypothesis was accepted.

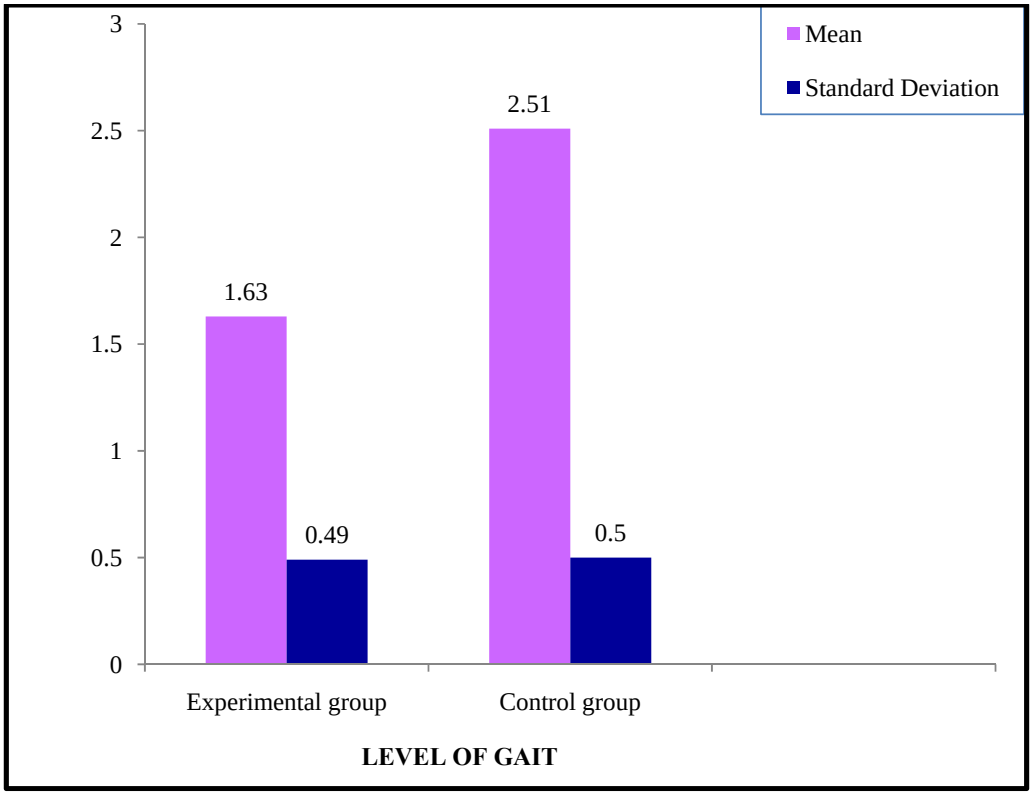

Figure 17: Comparison of posttest level of gait among hemiplegic patients between experimental and control group.

Table 6: Comparison of the pre and posttest level of gait among hemiplegic patients in experimental group

(N = 30)

S. No	Level of gait	Pretest		Posttest		Mean Difference	t Value
		Mean	Standard Deviation	Mean	Standard Deviation		
1	Experimental group	2.63	0.49	1.63	0.49	1	10.98 S

S = Significance

Table 6 reveals the paired‘t’ test to compare the pre and posttest level of gait among experimental group. With regard to the pre and posttest level of gaitamong experimental group it was found that the‘t’ value was 10.98, indicating that there was a highly significant reduction in gait impairment among the experimental group at $p<0.05$ level. The statedresearch hypothesis was, “the mean post test level of gaitamong hemiplegic in experimental group will be significantly higher than their mean pre test level of gait.”Hencethe research hypothesis was accepted.

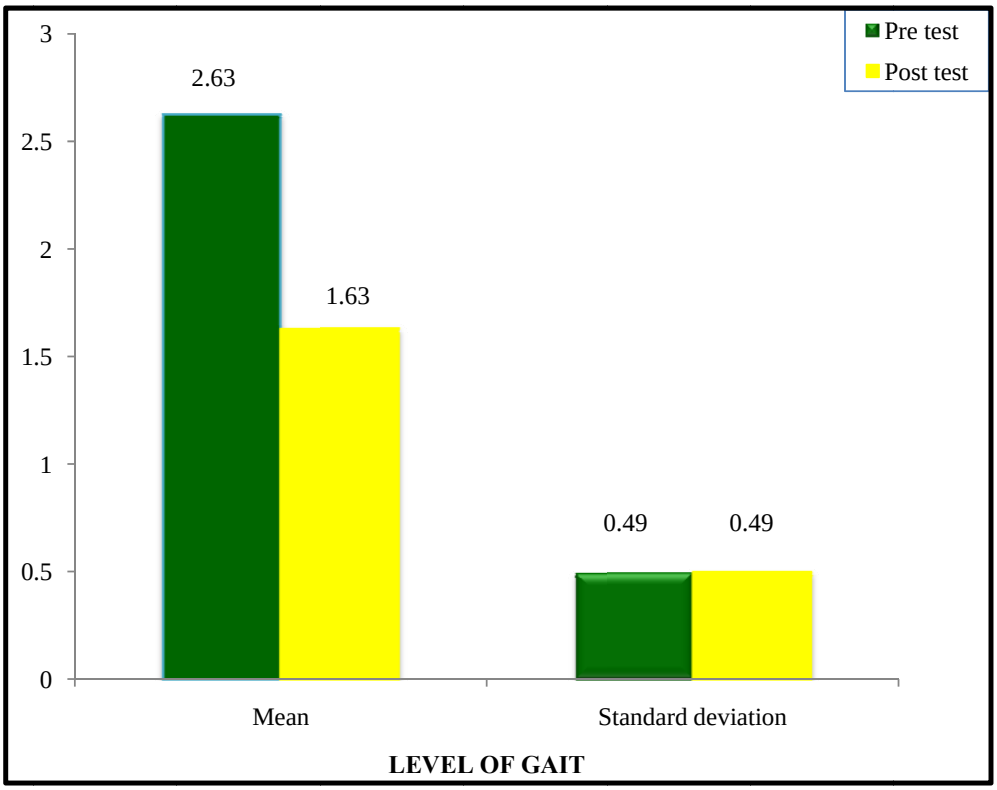

Figure 18: Comparison of the pre and posttest level of gaitamong hemiplegic patients in experimental group.

SECTION IV:

ASSOCIATION OF POSTTEST LEVEL OF GAIT AMONG PATIENTS WITH HEMIPLEGIAIN EXPERIMENTAL AND CONTROL GROUP WITH DEMOGRAPHIC VARIABLES.

Table 7: Association of posttest level of gaitamong patients with hemiplegia in experimental group with demographic variables

(N = 30)

S. No.	Demographic Variables	Level of Gait								χ^2
		Normal gait		Mild gait impairment		Moderate gait impairment		Severe gait impairment		
		f	%	f	%	f	%	f	%	
1	**Age**									
	a) 31-40 years	0	0	3	10	3	10	0	0	4.716
	b) 41-50 years	0	0	4	13.33	6	20	0	0	d(f)=3
	c) 51-60 years	0	0	7	23.33	7	23.33	0	0	NS
2	**Gender**									
	a) Male	0	0	10	33.33	12	40	0	0	0.263
	b) Female	0	0	4	13.33	4	13.33	0	0	d(f)=1
										NS
3	**Education**									
	a) No formal education	0	0	2	6.66	2	6.66	0	0	1.435
										d(f)=5
	b) Primary school Education	0	0	2	6.66	3	10	0	0	NS
	c) Secondary school education	0	0	2	6.66	4	13.33	0	0	
	d) Higher secondary school education	0	0	3	10	5	16.66	0	0	
	e) Under graduate	0	0	2	6.66	1	3.33	0	0	
	d) Post Graduate	0	0	3	10	1	3.33	0	0	

Table7 continues….

S.No.	Demographic Variables	Level of Gait								χ 2
		Normal gait		Mild gait impairment		Moderate gait impairment		Severe gait impairment		
		f	%	f	%	f	%	f	%	
4	**Occupation**									
	a) Sedentary worker	0	0	5	16.66	4	13.33	0	0	3.63
	b) Moderate worker	0	0	5	16.66	9	30	0	0	d(f)=3
	c) Heavy worker	0	0	4	13.33	3	10	0	0	NS
5	**Body mass index**									
	a) <18	0	0	1	3.33	0	0	0	0	6.316
	b) 18 - 24	0	0	3	10	2	6.66	0	0	d(f)=3
	c) 25 - 30	0	0	7	23.33	8	26.66	0	0	NS
	d) >35	0	0	3	10	6	20	0	0	
6	**Bad habits**									
	a) Yes	0	0	4	13.33	10	33.33	0	0	3.543
	b) No	0	0	10	33.33	6	20	0	0	d(f) = 1
										S
7	**Dietary habits**									
	a) Vegetarian	0	0	4	13.33	1	3.33	0	0	0.149
	b) Non vegetarian	0	0	10	33.33	15	50	0	0	d(f) =1
										NS

Table7 continues….

S.No.	Demographic Variables	Level of Gait								χ^2
		Normal gait		Mild gait impairment		Moderate gait impairment		Severe gait impairment		
		f	%	f	%	f	%	f	%	
8	**Systemic illness**									
	a) Diabetes mellitus	0	0	2	6.66	2	6.66	0	0	
	b) Hypertension	0	0	5	16.66	9	30	0	0	5.858
	c) Both diabetes and hypertension	0	0	5	16.66	2	6.66	0	0	d(f)=4 NS
	d) Other illnesses	0	0	1	3.33	2	6.66	0	0	
	e) None	0	0	1	3.33	1	3.33	0	0	

NS = Non Significant.

S = Significant.

No significant association except bad habits.

Table 7reveals the chi-square test to associate the post test level of gait with the selected demographic variables like age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness in the experimental group. While analyzing the statistical significance at ($P<0.05$) level. It shows that there was no significant association of the post test level of gait with the selected demographic variables at $P<0.05$ level except bad habits. Thestated research hypothesis was,“there will be a significant association between posttest level of gait among hemiplegic patients in experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness.”Hence the research hypothesis was rejected.

Table 8: Association of posttest level of gaitamong patients with hemiplegia in control group with demographic variables

(N = 30)

S. No.	Demographic Variables	Level of Gait								χ^2
		Normal gait		Mild gait impairment		Moderate gait impairment		Severe gait impairment		
		f	%	f	%	f	%	f	%	
1	**Age**									
	a)31-40 years	0	0	0	0	1	3.33	4	13.33	2.434
	b)41-50 years	0	0	0	0	4	13.33	5	16.66	d(f)=6
	c)51-60 years	0	0	0	0	8	26.66	8	26.66	NS
2	**Gender**									0.68
	a) Male	0	0	0	0	9	33.33	12	40	d(f)=1
	b) Female	0	0	0	0	4	13.33	5	16.66	NS
3	**Education**									
	a) No formal education	0	0	0	0	5	16.66	2	6.66	9.08 d(f)=5
	b) Primary school Education	0	0	0	0	1	3.33	5	16.66	NS
	c) Secondary school education	0	0	0	0	4	13.33	2	6.66	
	d) Higher secondary school education	0	0	0	0	1	3.33	5	16.66	
	e) Under graduate	0	0	0	0	1	3.33	1	3.33	
	d) Post Graduate	0	0	0	0	1	3.33	2	6.66	
4	**Occupation**									
	a) Sedentary worker	0	0	0	0	8	26.66	7	23.33	3.63
	b) Moderate worker	0	0	0	0	2	6.66	8	26.66	d(f)=3
	c) Heavy worker	0	0	0	0	3	10	2	6.66	NS

Table8 continues….

S. No.	Demographic Variables	Level of Gait								χ^2
		Normal gait		Mild gait impairment		Moderate gait impairment		Severe gait impairment		
		f	%	f	%	f	%	f	%	
5	**Body mass index**									
	a) <18	0	0	0	0	1	3.33	1	3.33	5.518
	b) 18 - 24	0	0	0	0	4	13.33	5	16.66	d(f)=3
	c) 25 - 30	0	0	0	0	6	20	7	23.33	NS
	d) >35	0	0	0	0	2	6.66	4	13.33	
6	**Bad habits**									
	a) Yes	0	0	0	0	10	33.33	9	30	0.142
	b) No	0	0	0	0	3	10	8	26.66	d(f) = 1
										NS
7	**Dietary habits**									0.332
	a) Vegetarian	0	0	0	0	1	3.33	2	6.66	d(f) =1
	b) Non vegetarian	0	0	0	0	12	40	15	50	NS
8	**Systemic illness**									
	a) Diabetes mellitus	0	0	0	0	3	10	5	16.66	3.71
	b) Hypertension	0	0	0	0	6	20	6	20	d(f)=4
	c) Both diabetes and hypertension	0	0	0	0	2	6.66	5	16.66	NS
	d) Other illnesses	0	0	0	0	1	3.33	0	0	
	e) None	0	0	0	0	1	3.33	1	3.33	

NS = Non Significant.

S = Significant.

Table 8 reveals the chi-square test to associate the post test level of gait with the selected demographic variables like age, gender, education, occupation, body mass

index, bad habits, dietary habits, and systemic illness in the control group. While analyzing the statistical significance at ($P<0.05$) level. It shows that there was no significant association of the post test level of gait with the selected demographic variables at $P<0.05$ level. The stated research hypothesis was, “there will be a significant association between posttest level of gait among hemiplegic patients in experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness.” Hence the research hypothesis was rejected.

CHAPTER V

DISCUSSION

This chapter deals with the discussion of the result of the data analysis to evaluate the effectiveness of proprioceptive neuromuscular facilitation on level of gait among patients with hemiplegia.

The discussion is based on the objectives of the study and the hypotheses specified in the study.

MAJOR FINDINGS OF THE STUDY WERE

On analysis of frequency and percentage of demographic variables, majority of the patients 14(46.7%) were between the age group of 51-60 years among hemiplegic patients in experimental group, whereas in the control group 16(53.3%) of subjects were between the age group of 51-60 years. With regard to gender classification, majority of patients 22(73.3%) were male in the experimental group, whereas in the control group 21(70%) of subjects were male.

With respect to education majority of the patients 8(26.7%) were having higher secondary school education in the experimental group, whereas in the control group 7(23.3%) of subjects were illiterate. With regard to occupation majority of patients 14(46.7%) were belongs to moderate worker in the experimental group, whereas in the control group 15(50%) of subjects were belongs to moderate worker.

Regarding the body mass index majority of patients, 15(50%) of them were overweight in the experimental group. whereas in the control group, majority of patients 13(43.3%) of them were having overweight.

With respect to bad habits majority of the patients 16(53.3%) were did not have any bad habits in the experimental group, whereas in the control group

19(63.3%) of them were having bad habits. With regard to dietary habits majority of patients 25(83.3%) were non vegetarian in the experimental group, whereas in the control group 27(90%) of subjects were non vegetarian.

Regarding the systemic illness majority of patients, 14(46.7%) of them were having hypertension in the experimental group. whereas in the control group, majority of patients 12(40%) of them were having hypertension.

The first objective was to assess the pretest and posttest level of gait among patients with hemiplegia in experimental and control group.

On analysis the pretest level of gait among experimental group patients, 12(40%) of them had moderate gait impairment, and majority of patients 18(60%) had severe gait impairment, and in the control group 11(36.66%) of patients had moderate gait impairment, and majority of patients 19 (63.33%) had severe gait impairment.

On analysis the posttest level of gait among experimental group patients, 14(46.66%) of them had mild gait impairment, and majority of patients 16(53.33%) had moderate gait impairment, and in the control group 13(43.33%) of patients had moderate gait impairment, and some of the patients 17(56.66%) had severe gait impairment.

The above result was supported by **Pizzi A, et al (2007),** A survey report showed that inDepartment of Neuro rehabilitation, Italy ten healthy subjects and 56 hemiplegic outpatients, more than 12 months hemiplegic stroke, continuously admitted in a rehabilitation centre. Patients were videotaped while walking at a comfortable speed. Quantitative and clinical gait parameters were derived from videotaped walking tasks at admission and at the end of a period of rehabilitation training. Qualitative features were assessed using the Wisconsin Gait Scale. After

training, the median Wisconsin Gait Scale score improved significantly (28 vs 26.5; p = 0.003). In particular, "weight shift to paretic side" and patterns during the swing phase of the affected leg were improved. Gait velocity (0.3 vs 0.4 m/sec; p = 0.001) and stride length (77 vs 85 cm; p = 0.0002) increased significantly, whereas number of steps (25 vs 23; p = 0.004), stride period (2.5 vs 2.3 sec; p = 0.04), and stance period (2.1 vs 2 sec; p = 0.03) of the unaffected side were reduced.

The second objective was to find out the effectiveness of proprioceptive neuromuscular facilitation on level of gait among patients with hemiplegia in experimental group.

On analysis of posttest level of gait among experimental group, some patients 14(46.66%) had mild gait impairment, 16(53.33%) of them had moderate gait impairment and none of them had severe gait impairment and in the control group 13(43.33%) of patients had moderate gait impairment, and majority of patients 17(56.66%) of them had severe gait impairment.

On analysis the mean score of gait among experimental group was 1.63 and control group was 2.51 after interventions. Standard deviation after intervention among experimental group was 0.49 and control group was 0.5 and calculated ‘t’ value was 7.16. It shows the level of gait has improved significantly in experimental group.

The above result was supported by **Hilde M. Feys, et al (2003)** conducted a single-blind, randomized, controlled multicenter trial study to determine the effect of proprioceptive neuromuscular facilitation on gait in patients with hemiplegia. 100consecutive patients were allocated to either an experimental group that received an additional treatment of proprioceptive neuromuscular facilitationto a control group. The intervention was applied for 6 weeks. Patients were evaluated for level of

impairment (Brunnström-Fugl-Meyer test). Patients in the experimental group performed better on the Brunnström-Fugl-Meyer test than those in the control group.

The third objective was to compare the pre and posttest level of gait among patients with hemiplegia in experimental group.

On analysis of pre and posttest level of gait among the experimental group, the mean gait score was 1.63 and standard deviation was 0.49 for the pretest and mean gait score was 2.63 with standard deviation was 0.49 for the posttest and calculated‘t’ value was 10.98. It shows the marked improvement of gait in experimental group.

The above result was supported by **Ray-Yau Wang (2003),** conducted a prospective study to evaluate the immediate and cumulative effects of proprioceptive neuromuscular facilitation (PNF) applied to the pelvic region on the gait of patients with hemiplegia. The subjects were 20 patients with hemiplegia of short duration ($\bar{X}$=4.4 months, SD=0.8, range=2.8–5.6, n=10) or long duration ($\bar{X}$=15.4 months, SD=1.7, range=12.7–18.5; n=10). Each subject received a total of 12 sessions of PNF, with each treatment lasting for 30 minutes. In subjects with hemiplegia of short duration, gait speed and cadence improved immediately after 1 session of PNF, and this improvement was further enhanced after 12 treatments.

The fourth objective was to associate the posttest level of gait among patients with hemiplegia in experimental and control group with the selected demographic variables. (age, gender, education, occupation, body mass index, etc)

Tables no (7, 8) analysis revealed there was no significant association between the post test level of gait and demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits and systemic illness,

exceptbad habits in experimental group.In experimental and control group, the calculated chi square value showed that there was no association between demographic variables and level of gait at p<0.05level.

The above result was supported by **Hanchaiphiboolkul, et al, (2004)** conducted a community based cohort study that has been conducted in five geographic regions of Thailand. Baseline health status survey was started in 2004 and enrollment continued until the end of 2006. In this analysis, baseline data of 19,997 participants aged 45 to 80 years were identified and analyzed as a cross-sectional analysis.Using multiple logistic regression analysis, factors associated with higher hemiplegic stroke were male gender ($p < 0.001$), occupational class ($p < 0.001$), geographic region ($p < 0.001$), hypertension ($p < 0.001$), diabetes mellitus ($p = 0.002$) and hypercholesterolemia ($p = 0.026$).Hence, the research hypothesis (H3) stated that “There will be significant association between Posttest level of gait among experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness” was rejected.

From the above analysis and interpretations, the hypothesis (H1), “The mean posttest level of gait among hemiplegic patients in experimental group will be significantly higher than the mean pretest level of gait in the control group", the hypothesis (H2), " The mean posttest level of gait among hemiplegic patients will be significantly higher than the mean pretest level of gait in the experimental group" were accepted and the hypothesis (H3), “There will be significant association between Posttest level of gait among experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness” was rejected.

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATION, LIMITATIONS AND RECOMMENDATIONS

Thischapter deals with summary, findings, conclusion, implications, limitations and recommendations, which creates a base for evidence based practice.

SUMMARY

There are more than 600,000 people with disabilities worldwide, and hemiplegia is one of the more common disabling conditions. It is defined as the paralysis of one side of the body.The prevalence rate per 100,000 population is 68.5 in males and 44.8 in females in India. It is evident that the prevalencerate increases with age.**(World Health Organization, 2007)**

Rapid socio-economic changes have led to changes in people's lifestyle, work related stress, altered food habits are the risk of developing hypertension, diabetes and hyperlipidaemia. This coupled with increased lifespan has resulted in increase in the incidence of hemiplegia. Indians may also be genetically prone for hemiplegia due to high prevalence of metabolic syndrome. In India 10% to 15% of stroke related hemiplegia occur in people aged below 40 years. **(Kaul S, et al 2009)**

A recent research showed that in subjects with hemiplegia of short duration gait speed and cadence improved immediately after 1 session of PNF, and this improvement was further enhanced after 12 treatments. And also in subjects with hemiplegia of long duration did not improve immediately, although the cumulative effect of the treatments was similar to that observed in subjects with hemiplegia of short duration. These data suggest that for patients with hemiplegia, the cumulative effects of PNF are more beneficial.

This study was undertaken to assess the effectiveness of proprioceptive neuromuscular facilitation on improvement of gait among patients with hemiplegia in selected hospitals at Tirunelveli district.

The Objectives of the study were:

- To assess the pretest and posttest level of gait among hemiplegic patients in experimental and control group.
- To find the effectiveness of Proprioceptive Neuromuscular facilitation on improvement of gait among hemiplegic patients in experimental group.
- To compare the pretest and posttestlevel ofgait among hemiplegic patients in experimental group.
- To associate the posttest level of gait among hemiplegic patients in experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness.

All Hypotheses formulated were:

- H1 – The mean posttest level of gait among hemiplegic patients in experimental group will be significantly higher than the mean posttest level of gait in the control group.
- H2 – The mean posttest level of gait among hemiplegic patients will be significantly higher than the mean pretest level of gait in the experimental group.
- H3 _ There will be a significant association between Posttest level of gait among hemiplegic patients in experimental and control group with their selected demographic variables such as age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness.

The assumptions of the study were:

- All hemiplegic patients may experience difficulty in movement.
- Proprioceptive neuromuscular facilitation application may improve the gait among hemiplegic patients within short duration.
- It may reduce the economic burden and hemiplegic immobility.
- It may improve the independency and quality of life of hemiplegic patients.

The review of literature collected for the study provided a strong basis for the study. It provided the basis for creating conceptual frame work and formation of tool. It was categorized under three headings:

Section A: Studies related to prevalence and risk factors of hemiplegia.

Section B: Studies related to gait impairment among hemiplegic patients.

Section C: Studies related to proprioceptive neuromuscular facilitation on improvement of gait among hemiplegic patients.

The conceptual frame work of this study was based on Modified Orlando's Deliberative Nursing Process Theory and it provided a complete frame work for achieving the central purpose of the study. The research methodology adopted for the study was quasi experimental pretest and posttest control group design.

The Study was conducted in selected hospitals in Tirunelveli named Shifa hospital, Peace health centre and Galaxy hospital. The Sample size for the study was 60, 30 persons were in experimental group another 30 persons were in control group. The samples were selected based on the inclusive criteria by using purposive sampling technique.Pilot study was conducted at Shifa hospital in Tirunelveli district and the findings revealed that the tool was feasible, reliable and practicable to proceed with the main study.

The content validity of the tool was established by four experts from the medical surgical nursing department, one physiotherapist and one medical expert.

The main study was conducted in Shifa hospital, Peace health centre and Galaxy hospital at Tirunelveli. The total sample size was sixty samples who fulfilled the inclusive criteria were allotted to experimental group (n = 30) and in control group (n=30) by purposive sampling technique. The collected data was analyzed and interpreted based on the objectives using descriptive and inferential statistics.

There was no association between the level of gait and age, gender, education, occupation, body mass index, bad habits, dietary habits, and systemic illness except presence of bad habits in the experimental group. Obtained chi square value was significant at 0.05 levels.

CONCLUSION

This study assessed the effectiveness of proprioceptive neuromuscular facilitation on improvement of gait among patients with hemiplegia. The study findings revealed that there was a significant improvement on the level of gait after application of proprioceptive neuromuscular facilitation in the experimental group. On the basis of the study, the researcher concluded that application of proprioceptive neuromuscular facilitation exercise has a significant effect on hemiplegic gait. Proprioceptive neuromuscular facilitation exercise is an effective, easy to apply and potentially risk free intervention for hemiplegic patents after stroke attack. It improves independency and quality of life of hemiplegic stroke survivors.

IMPLICATION

Investigator has derived from the study the following implications that are of vital concern in the field of nursing practice, nursing education, nursing administration and nursing research.

NURSINGPRACTICE

- The nurses have a vital role in providing safe and effective nursing care to enhance independency by improving gait level among patients with hemiplegia.
- This can be facilitated by motivating the nurses to have an in depth knowledge in proprioceptive neuromuscular facilitation exercises for speedy recovery of hemiplegic patients.
- Develop skill in providing efficient nursing care for preventing post stroke immobility and to teach the samples about the effectiveness of proprioceptive neuromuscular facilitation for improving gait and mobility.
- Nurses need to practice evidence based approach while giving care to the hemiplegic patients to improve quality of life of stroke patients.

NURSINGEDUCATION

Before nurses enter into for their practice, they need to have strong foundation in terms of education. Nurse educator not only have a role to educate the student but also to educate the staff nurses in order to prepare them and update their knowledge, to enhance the application of theory in to practice. The education in the clinical area should be provided in the form of:

1. Incorporate various ROM exercises like proprioceptive neuromuscular facilitation in the curriculum of nursing with clinical experience.
2. To motivate students to follow proprioceptive neuromuscular facilitation for hemiplegic patients to prevent hemiplegic immobility.
3. Update the knowledge of staff nurse with inservice education programs emphasizing various measures in improving gait and mobility of hemiplegic patients.

4. Make use of available studies related to hemiplegia and its management.

NURSING ADMINISTRATION

1. Conduct in service education programs and continuing education programs for effective management for hemiplegic patients.
2. Collaborate with governing bodies for the formulation of standard policies and protocols to emphasize nursing care for hemiplegic patients.
3. Provide more opportunities for nurses to attend training programs in exercise therapies for improving gait and quality of life of hemiplegic patients:
    - Conduct in-service education programs and continuing education programs on hemiplegia and its management.
    - Arrange and conduct workshops, conferences, seminars on proprioceptive neuromuscular facilitation on improvement in level of gait.
    - Provide opportunities for nurses to attend training programs on proprioceptive neuromuscular facilitation exercises on hemiplegic gait.

NURSING RESEARCH

1. Nurse researcher can disseminate the findings of the studies through conference, seminar and publishing in professional journals to the Medical Surgical staff.
2. Nurse researcher can encourage conducting further researches related to proprioceptive neuromuscular facilitation.
3. The findings of the research study would help in building and strengthening the body of knowledge.
4. As a nurse researcher, promote more research on effective measures in control of hemiplegic immobility.
5. Evidence based nursing practice must take higher profile in order to increase the knowledge about proprioceptive neuromuscular facilitation on hemiplegic gait to improve quality of life of stroke patients.

LIMITATION

During the period of study the limitations faced by the investigator were as follows,

1. Only limited literatures and studies were obtained from the Indian context.
2. Due to time constraints, the investigator was unable to take larger samples for the study.

RECOMMENDATIONS

Based on the findings of the present study the following recommendations are made:

1. The similar study can be conducted with large samples for better generalisation.
2. The study can be conducted to assess the knowledge and practice of nurses with regard to proprioceptive neuromuscular facilitation for hemiplegic patients.
3. A comparative study can be conducted by using Proprioceptive neuromuscular facilitation versus massage therapy on improvement of gait amonghemiplegic patients.
4. The similar study can be conducted in the community setting for hemiplegic patients.
5. The same study can be repeated by using the true experimental design.

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APPENDIX A

LETTER SEEKING PERMISSION FOR CONDUCTING THE STUDY

To

The Managing Director,
Shifa Hospitals,
82, Middle Street,
Kailasapuram,
Tirunelveli - 627001.

Mrs.S.Hilda is a bonafide student of our college studying in M.Sc(N) programme. As a partial fulfilment of the university requirement for the award of the M.Sc(N) degree, she needs to conduct research project.

Her chosen research project is as follows **"A study to assess effectiveness of Proprioceptive neuromuscular facilitation on improvement of gait among hemiplegic patients in selected hospitals, at Tirunelveli."**

She will abide by rules and regulations of the hospital and adhere to the policies during her period of data collection from 1-8-2013 to 31-8-2013. Permission may kindly be granted to her for conduction of the study at your esteemed centre.

Further details of the proposal project will be furnished by the student personally, confidentiality will be ensured in the research project.

Thanking you

Yours faithfully,

SRI K. RAMACHANDRAN NAIDU COLLEGE OF NURSING

Approved by Govt. of Tamilnadu and Indian Nursing Council / T.N.C
Affiliated to the Tamilnadu Dr. M.G.R. Medical University

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E - Mail : srikmcon@yahoo.com Web : srikmaducollegeofnursing.org

To,

The Managing Director,
Shifa Hospitals,
82, Middle Street,
Kailasapuram,
Tirunelveli – 627001

Mrs.S.Hilda is a bonafide student of our college studying in M.Sc (N) programme. As a partial fulfillment of the university requirement for the award of the M.Sc (N) degree, she needs to conduct research project.

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Further details of the proposal project will be furnished by the students personally, confidentiality will be ensured in the research project.

Thanking you

Yours faithfully

Administrative Officer
SHIFA HOSPITALS
82, Kailasapuram Middle St.,
Tirunelveli Junction - 627 001

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E - Mail : srikmcon@yahoo.com Web : srikmaiducollegeofnursing.org

To,

The Managing Director,
Peace Health Center,
Near New Bus Stand,
Bypass Road, Melapalayam,
Tirunelveli – 627003

Mrs.S.Hilda is a bonafide student of our college studying in M.Sc (N) programme. As a partial fulfillment of the university requirement for the award of the M.Sc (N) degree, she needs to conduct research project.

Her chosen research project is as follows **"A study to assess effectiveness of Proprioceptive neuromuscular facilitation on improvement of gait among hemiplegic patients in selected hospitals, at Tirunelveli".**

She will abide by rules and regulation of the hospital and adhere to the policies during her period of data collection from 01.08.2013 to 31.08.2013. Permission may kindly be granted to her for conduction of the study at your esteemed center.

Further details of the proposal project will be furnished by the students personally, confidentiality will be ensured in the research project.

Thanking you

Yours faithfully

Principal
Sri K. Ramachandran Naidu
College of Nursing
K.R. Naidu Nagar - 627 753, Karivalam (Via)
Sankarankovil (T.K.) Tirunelveli Dt.,

Yes please

Dr. R. Anburajan, M.Sc. (PHYS), M.B.A. FROM IGNOU
Reg. No : 47435
Peace Health Centre
48.H/5, By Pass Road,
Tirunelveli - 627 005.

PEACE HEALTH CENTRE
Phone : 2552187 2552138
TIRUNELVELI-7.

SRI K. RAMACHANDRAN NAIDU COLLEGE OF NURSING

Approved by Govt. of Tamilnadu and Indian Nursing Council / T.N.C
Affiliated to the Tamilnadu Dr. M.G.R. Medical University

K.R. Naidu Nagar - 627 753, Paruvakudi Village, Post Bag No 1, Kamyalam (via)
Sankarankovil (Tk), Tirunelveli (Dt), Ph. : 04636 - 260950, Fax : 04636 - 260377.
E - Mail : srkmcon@yahoo.com Web : srkmaiducollegeofnursing.org

To,

The Managing Director,
Galaxy Hospitals,
110 – E, North bypass road,
Vannarpettai,
Tirunelveli – 627003

Mrs.S.Hilda is a bonafide student of our college studying in M.Sc (N) programme. As a partial fulfillment of the university requirement for the award of the M.Sc (N) degree, she needs to conduct research project.

Her chosen research project is as follows **"A study to assess effectiveness of Proprioceptive neuromuscular facilitation on improvement of gait among hemiplegic patients in selected hospitals, at Tirunelveli"**.

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Further details of the proposal project will be furnished by the students personally, confidentiality will be ensured in the research project.

Thanking you

Yours faithfully

Principal
Sri K. Ramachandran Naidu
College of Nursing
K.R. Naidu Nagar - 627 753, Kamyalam (Via)
Sankarankovil (T.K.) Tirunelveli Dt.

APPENDIX B

LETTER SEEKING EXPERT'S OPINION FOR CONTENT VALIDITY

From

S. Hilda,
M.Sc (N) II year,
Sri.K.Ramachandran Naidu College of Nursing,
Sankarankovil (Tk), Tirunelveli (Dt).

To

Respected Sir/Madam,

Subject: Request for opinion and suggestions of expert for establishing content validity of research tool.

I S.Hilda, II year student of Master of nursing course (Medical Surgical Nursing) at Sri.K.Ramachandran Naidu College of Nursing. I have selected the topic for my dissertation, **"A study to assess the effectiveness of proprioceptive neuromuscular facilitation on improvement of gait among hemiplegic patients in selected hospital at Tirunelveli."** to be submitted to Dr. M.G.R. Medical University, in partial fulfillment of university requirement for award of master of nursing degree. I humbly request you to kindly validate the tool and give your valuable suggestions. Your prompt opinions and suggestions will be appreciated.

Thanking you,

Place:

Yours faithfully,

Date:

(S. Hilda)

Enclosures:

- Content validation certificate
- Statement of problem, objectives of the study, operational definitions, methodology
- Research tool
- Criteria check list for validation of tool.

APPENDIX – C

LIST OF EXPERTS FOR CONTENT VALIDITY

MEDICAL EXPERTS

1. **Dr.R.AnbuRajan,**BSC,MBBS, DMLS, FHM, DFM, FCGP;
   Director,
   Peace Health Centre**,**
   South Bye Pass Road,
   Tirunelveli - 627002.

NURSING EXPERTS

1. **Mrs. Jaya Thangaselvi,**
   Professor,
   C.S.I. JeyarajAnnapakiumcollege of nursing,
   Passumalai,
   Madurai -4.

2. **Mrs. JerlinePriya,**
   Principal,
   AnnammalCollege of nursing,
   Kuzhithurai,
   Kanyakumaridist-629 802

3. **Mrs. Sharmila Rani,**
   Professor in medical surgical nursing,
   Christian College Of Nursing,
   Neyyoor, Kanyakumari dist.-629 802

4. **Mrs. Tamil Selvi,**
   Reader in medical surgical nursing,
   Bishop's College Of Nursing,
   Dharapuram, Erodedist.-638 656

APPENDIX – D

CERTIFICATE OF ENGLISH EDITING

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mrs.S.Hilda,II year M.Sc Nursing student of Sri.K.Ramachandran Naidu College of Nursing, Sankarankovil (Tk),Tirunelveli District, has done a dissertation study on **"TO ASSESS THE EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON IMPROVEMENT OF GAIT AMONG PATIENTS WITH HEMIPLEGIA IN SELECTED HOSPITALS, AT TIRUNELVELI"**April 2014,this study was edited for English language appropriateness.

Signature

CERTIFICATE OF ENGLISH EDITING

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mrs.S.Hilda, II year M.Sc Nursing student of Sri.K.Ramachandran Naidu College of Nursing, Sankarankovil (Tk), Tirunelveli District, has done a dissertation study on **"TO ASSESS THE EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON IMPROVEMENT OF GAIT AMONG PATIENTS WITH HEMIPLEGIA IN SELECTED HOSPITALS, TIRUNELVELI."**April 2014.

this study was edited for English language appropriateness.

J. Bagyalakshmi

...gi, Assistant, Ele.Education Office,
Aruathirunagari (at Theethiruperai),
...Thathakudi-628613 Tamilnadu

APPENDIX –E

INFORMED CONSENT

Good Morning,

I am, **Mrs. S. Hilda,**M.sc Nursing II Year student of Sri.K.Ramachandran Naidu College of Nursing, conducting a study **"TO ASSESS THE EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON IMPROVEMENT OF GAIT AMONG HEMIPLEGIC PATIENTS IN SELECTED HOSPITALS, TIRUNELVELI."**a partial fulfillment of the requirement for the degree of M.Sc Nursing under The Tamil Nadu Dr. M.G.R Medical University. The hemiplegicpatients will be given thirty minutes of proprioceptive neuromuscular facilitation exercises two timesin aday for six days. Gait will be assessed by using modified Wisconsin gait scale after the intervention.

I assure you that information obtained will be kept confidential. So, I request you to kindly co operate with me and participate in this study by giving your frank and voluntary consent.

Thank you.

APPENDIX – F

DESCRIPTION OF THE TOOL

SECTION: A

It consists of a structured interview schedule. It has questions related to demographic data of the hemiplegic patients.

1 Age

a) 31 - 40years

b) 41 - 50years

c) 51 - 60years

2 Gender

a) Male

b) Female

3 Education

a) No formal education

b) Primary

c) Secondary

d) Higher secondary

e) Under graduate

f) Post graduate

4 Occupation

a) Sedentary worker

b) Moderate worker

c) Heavy worker

5 Body mass index

a) Under weight (below 18)

b) Normal weight (18 – 24)

c) Over weight (25 - 30)

d) Obese (31 – 35)

6 Bad habits

a) Yes

b) No

7 Dietary habits

a) Vegetarian

b) Non vegetarian

8 Systemic illness

a) Diabetes Mellitus

b) Hypertension

c) Both diabetes and hypertension

d) Other illnesses

e) None

SECTION B

Modified Wisconsin gait scale will be used to assess the level of gait among hemiplegic patients.

S.No	SUBMEASURE	FINDINGS	POINTS
1.	Use of hand held gait aid	no gait aid	1
		minimal gait aid use	2
		minimal gait use wide base	3
		marked use	4
		marked use wide base	5
2.	Stance time on impaired side	equal (time spent of affected side same as time spent of unaffected side during single leg stance)	1
		unequal	2
		very brief	3
3	Step length of unaffected side	step through (heel of unaffected foot clearly advance beyond the toe of the affected foot)	1
		foot does not clear	2
		step to (unaffected foot placed behind or up to affected foot but not beyond)	3
4	Weight shift to the affected side (with or without gait aid)	full shift (head and trunk shift laterally over the affected foot during the single stance)	1
		decreased shift	2
		very limited shift	3
5	Stance width	normal (up to 1 shoe between feet)	1
		moderate (up to 2 shoe widths)	2
		wide (more than 2 shoe widths)	3
6	Guardedness	none (good forward movement with no hesitancy noted)	1
		slight	2
		marked hesitation	3

7	Hip extension of affected side	equal extension (hips equally extend during push off maintains erect posture during toe off)	1
		slight flexion	2
		marked extension	3
8	External rotation during initial swing	same as unimpaired leg	1
		increased rotation	2
		marked	3
9	Circumduction at mind swing	none (affected foot adducts no more than unaffected foot during swing)	1
		moderate	2
		marked	3
10	Hip hiking at mid swing	none (pelvis Slightly during swing)	1
		elevation	2
		vaults	3
11	Knee flexion from toe off to mid swing	normal (affected knee flexes equally to unaffected side)	1
		some	2
		minimal	3
		none	4
12.	Toe clearance	normal (toe clears floor throughout swing)	1
		slight drag	2
		marked	3
13	Pelvic rotation at terminal swing	forward (pelvis rotated forward to prepare for heel strike)	1
		neutral	2
		retracted	3
14	Initial foot contact	heel strike (heel makes the initial contact with the floor)	1
		foot flat	2
		no contact of heel	3

Scoring Key:

Modified Wisconsin gait scale consists of 14 items. The lowest score indicates normal gait and the highest score indicates more gait impairment.The total score of the rating was 45. In this 14 rates will be marked as “0” score, 15 to 25 rates will be marked as “1” score, 26 to 35 rates will be marked as “2” score, and 36 to 45 rates will be marked as “3” score. The total score was 3. It was interpreted as follows;

S.No	DESCRIPTION	RATE	SCORE
1.	Normal gait	14	0
2.	Mild gait impairment	15 to 25	1
3.	Moderate gait impairment	26 to 35	2
4.	Severe gait impairment	36 to 45	3

APPENDIX - G

STEPS OF INTERVENTION

Pre exercise instruction:

- Explained the procedure and made the patient to lie in supine position on a firm comfortable surface or on the bed. Taught the importance of proprioceptive neuromuscular facilitation exercises and its effect on hemiplegic gait.
- Explained the exercise sequences to the patient.
- The researcher extended the patient's arm or leg to the point until there was a slight discomfort.
- The researcher has held the stretch for 5 seconds then released.
- The arm or leg was then pushed in toward the body and held for 5 seconds.
- The stretch was released to the extended position and held for another 5 seconds.

Upper extremity:

1. Flexion – abduction – external rotation

2. Extension – adduction – internal rotation

3. Flexion – adduction – internal rotation

4. Extension – abduction – external rotation

Lower extremity:

1. Flexion – abduction – external rotation

2. Extension – adduction – internal rotation

3. Flexion – adduction – internal rotation

4. Extension – abduction – external rotation

Post exercise instruction:

- Ten repetition of each pattern was done before proceeding to the next pattern.
- Exercises were done 30 minutes two times a day for 6 days.
- Instructed the patient to go for a walk around the bed for 2 to3 minutes.